VOLUME 38
NUMBER 5

MAY, 1951

plating

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MAKING ELECTROTYPES

See Contents Page 453

BLACK

can be beautiful

.....if it's

JETAL BLACK

JETAL meets U. S. Army spec. 57-O-2C for Type III Class A Finish

JETAL provides maximum resistance to wear and penetration

JETAL will not chip, peel, crack, crumble or dust off

JETAL makes no change in the dimensions of the work-piece

JETAL is an ideal base for lacquer, enamel or japan

JETAL may be resistance or spot welded

JETAL resists corrosion

JETAL is quickly applied by immersion —no current required

JETAL gives an attractive black finish—subdued or lustrous as specified. The process is a simple immersion method for blackening ferrous metals by oxidation. Even with unskilled labor it can be applied in five minutes for ordinary requirements. The low cost of materials, together with the simplicity of the process, make this an exceedingly economical method.

Jetal provides an excellent base for lacquers and other organic coatings, improving adhesion and retarding undercoat corrosion. It is widely used on aircraft and automobile parts, axles, bearings, bolts, cutting tools, engines, firearms, instruments, propellers, radio parts, cartridges, shells and a vast number of other items.

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538 FOREST STREET, KEARNY, N. J.

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Enthone strippers

no attack on the base metal

strip in barrels, baskets or bulk... without electric current

metal stripper A A new alkaline compound that chemically dissolves nickel, copper, zinc, cadmium and silver from steel without etching or attack. The steel is clean and ready for refinishing. Suitable for rack, basket or barrel stripping. Removes excess silver solder from steel rapidly. Patents pending.

metal stripper N-165S A compound added to acid solutions to promote rapid stripping of nickel, tin and lead coatings from copper alloys. No electric current is required.

WRITE FOR LIST OF SIXTY PRODUCTS AND PROCEDURES FOR METAL FINISHING

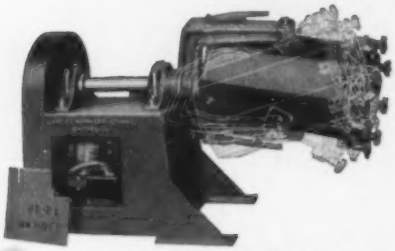
442 ELM STREET • NEW HAVEN, CONN.

USE "RELIANCE" PRODUCTS FOR

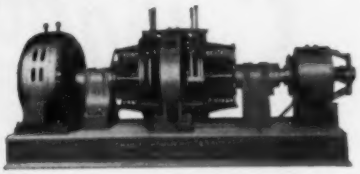
ECONOMY : EFFICIENCY : DEPENDABILITY

LET US SUPPLY YOUR NEEDS FOR YOUR PLATING OR POLISHING DEPARTMENT

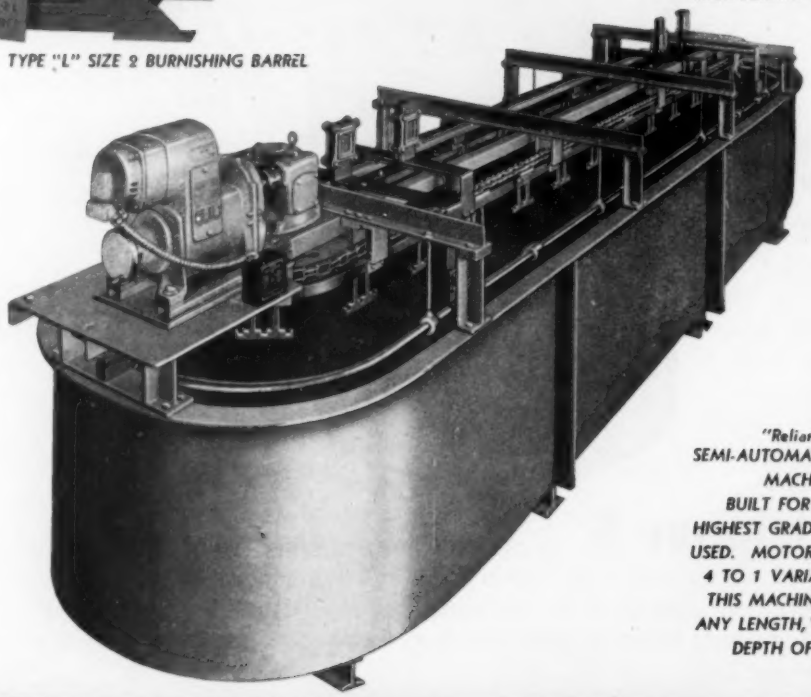
WRITE FOR FURTHER DETAILS



TYPE "L" SIZE 2 BURNISHING BARREL



3000 AMP. 6 VOLT GENERATOR SET



"Reliance"
SEMI-AUTOMATIC PLATING MACHINE
BUILT FOR SERVICE
HIGHEST GRADE MATERIAL USED. MOTOR ¾ to 1 HP
4 TO 1 VARIABLE SPEED.
THIS MACHINE IS BUILT ANY LENGTH, WIDTH AND DEPTH OF TANK.

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Philadelphia, Pa.

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4521 Ogden Ave.
CHICAGO

Branches:
Cleveland
and
Los Angeles

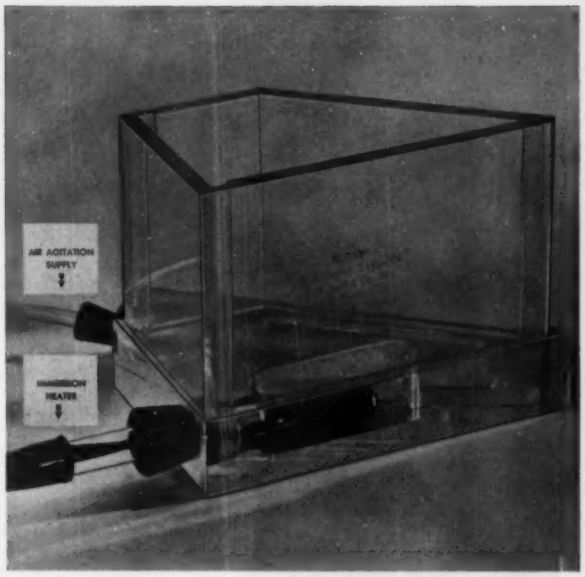
Announcing . . .

NEW MODEL W HULL CELL

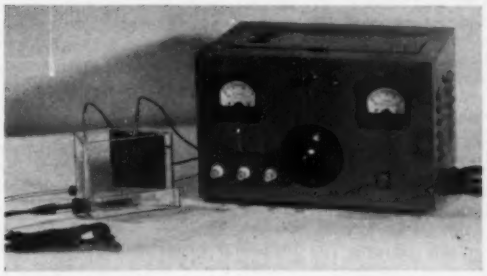
. . . Tests Plating Baths At Elevated Temperatures with Air Agitation!

The original Hull Cell is universally accepted as the simplest and most positive method for control of plating baths.

Now, ROHCO and Westinghouse have combined to develop a New Model W Hull Cell to fill the need for testing solutions such as bright nickel, high speed copper, tin, etc., which are normally operated under conditions of elevated temperature and which may require agitation.



Model W Hull Cell with Rectifier Gives 5 Minute Test!



TWO MODELS—with Filtered Output Rectifier for 110 Volt A.C. Current:—

MODEL B-267 (for Hull Cell only) gives 5 amps. —0 to 15 Volts.

MODEL B-1000 (for Hull Cell and General Laboratory use) gives 30 amps.—0 to 13 Volts, and 5 amps.—0 to 18 Volts.

ROHCO

OTHER ROHCO PRODUCTS

NO-CRO-MIST . ROHCO 20XL CADMIUM BRIGHTENER . ROHCO 100 BARREL AND 303 STILL ZINC BRIGHTENERS . ZINC PURIFIER . ZINC NO-FLASH . RINS-AID . CROMETER

R. O. HULL & CO., INC.

1302 Parsons Court

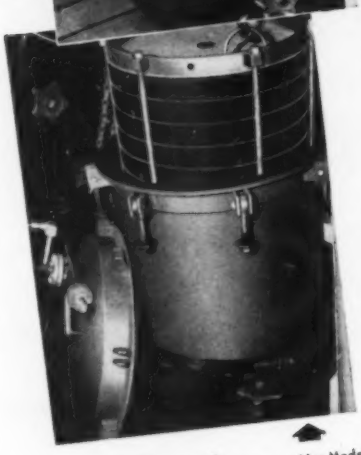
Rocky River 16, Ohio

No repairs or maintenance in over 17,000 hours of 'round-the-clock operation

... yet this **SPARKLER** *Horizontal Plate* **FILTER** *is still going strong*

The kind of service Sparkler Horizontal Plate Filters have given the Gillette Safety Razor Company—efficient and trouble-free, even under most extreme conditions—is the kind of service that is vital to *every* filtering operation.

For example: A rubber-lined Sparkler Model 8-18 filter is used by Gillette in the continuous filtration of a 1000-gallon bright nickel plating solution. Now operating for approximately two years, this filter has been on a 24 hours a day, 7 days a week schedule — without any loss of operating time for repairs or maintenance. Also used in periodic batch carbon treatments of nickel solutions this unit, according to Gillette technicians, consistently delivers a brilliantly clear effluent, even though the plates may be packed solid.



Top: Sparkler Model 8-18 filter shown installed in Gillette's plating department. Above: Same filter, with filter plate assembly being removed for cleaning

Another Sparkler Filter employed by Gillette is a Model 8-6, stainless steel, portable unit. Used exclusively for cyanide type plating solutions, this Model 8-6 has proved particularly valuable for Gillette's gold plating operations since the patented Sparkler Scavenger Plate assures minimum loss of precious gold solution. Now operating almost six months for at least 2 hours daily, its performance has been satisfactory in every respect.

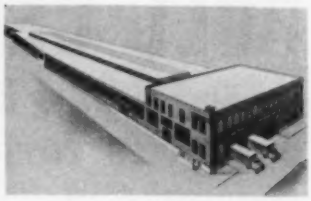
Left: Sparkler Model 8-6 stainless steel filter. This portable unit is used by Gillette to filter gold plating solutions.

Our Engineering Department (with more than 25 years' experience in every phase of filtration) is available for consultation without charge.

SPARKLER MANUFACTURING CO.
MUNDELEIN, ILLINOIS

Industry News

The Diversey Corporation, Chicago, has taken a 10-year lease on a steel frame and brick building at 400 Frelinghuysen Ave., Newark, N. J. The new building will provide its Eastern Division, formerly located in New York City, with new sales



office and for the first time manufacturing facilities of its own. Eric C. Foote, Jr., formerly Manager of the Diversey plant at Port Credit, Ont., will serve in the same capacity at the Newark plant.

The Udylite Corporation, at its annual sales meeting in Detroit on February 26, presented employees with 21 awards, 14 for outstanding sales records and seven for 15 or more years of continuous service. A gold pin for 25 years of service was presented to L. K. Lindahl, President, by C. H. Reeme, Udylite's Treasurer. W. J. Cluff, President of Frederic B. Stevens, Inc., a Udylite subsidiary, received a gold watch by Mr. Lindahl in token of 50 years of service with the Stevens organization.

Seven salesmen who topped the million dollar mark in sales for 1950 were given awards signifying membership in the Udylite "Million Dollar Club": Larry Stockwell, Detroit; David Stockton, Chicago; Jim Fitzgerald, Detroit; Vincent Kelly, Indianapolis; Joe Hoefer, Detroit; Lou Minbiole, Detroit, and William Moyer, Philadelphia. Employees who were honored with awards for 15 years of service were: H. J. Ward, Detroit District Sales Manager; William Jackson and Dr. R. B. Saltonstall, Detroit; John Pearsall, Cleveland; Lloyd Withington, Herman Marasus, and Vincent Zobel, Detroit.

During the sales meeting, which continued for three weeks, Udylite salesmen from all over the nation were briefed by department heads on metal finishing in the light of the defense program. L. V. Nagle, Vice-President and National Sales Manager, conducted the course.

Shutt Process Equipment Company, operated by George T. Shutt, has

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NEW-IMPROVED!

BLACK MAGIC

BLACK OXIDE PROCESS
for STEEL and IRON

As pioneers in the field of black finishing, our laboratories have now produced this new blackening salt which is a decided improvement over regular types — both in speed of application and corrosion resistance — plus ease of blackening previously hard-to-blacken items.

Compare these outstanding features!

- ★ One bath! One salt!
- ★ Faster blackening cycle
- ★ More corrosion resistant
- ★ Lower operating temperatures
- ★ Self rectifying
- ★ Easily blackens heat treated parts

Write for further details *Send items of your own manufacture for sample processing.*

MITCHELL-BRADFORD CHEMICAL COMPANY
MODERN METAL FINISHES
2446T MAIN ST., STRATFORD, CONN.

BLACK-MAGIC OXIDE BLACKING SALTS
WITCH-DIP & WITCH-OIL FINAL FINISHES

SILCO *Glass-Base* PROTECTIVE COATING
HEAT TREATING SALTS, CLEANERS, ETC.

Industry News

been appointed agent of Atlas Mineral Products Company for chemical-resistant materials of construction in the St. Louis territory. Mr. Shutt is a graduate of Washington University with a degree in chemical engineering.

Sel-Rex Precious Metals, Inc., 229 Main St., Belleville, N. J., has recently been formed, according to announcement by Morris M. Messing, President of Bart-Messing Corporation. With increased laboratory and manufacturing facilities, Sel-Rex will provide a wide variety of precious metal salts and solutions of gold, rhodium and silver.

Officers of the new company are: M. M. Messing, President; S. G. Bart, Secretary-Treasurer; and E. C. Rinker, Technical Director.

Wyandotte Chemicals' Ford Division Managers Map Conversion Program. Assistance to metal finishing and metal processing manufacturers converting to defense production was one of the key topics discussed by Wyandotte Chemicals' J. B. Ford Division district sales managers at a recent week's conference. Particular emphasis was placed on products which meet process requirements of JAN-C-490 Grade I, Type 2; Grade II, Type 6.

Wyandotte's president, Robert B. Semple, was featured speaker at the closing dinner. The managers inspected the construction progress of the new Wyandotte Chemicals' Research Center, which will permit the company to increase further its contribution to the defense program.

Minneapolis-Honeywell Regulator Company has assigned to the field staff of its Brown Instruments Division three new industrial managers and 18 additional men.

Joseph H. Matulis has been named industrial manager of Honeywell's Chicago Branch, Willard Smith of the Pittsburgh Branch, and Joseph H. Bowman of the Buffalo office. Merle O. Evers has been assigned to the San Francisco office; Frank J. Stevens to Los Angeles; William R. Coffman, Kansas City; Edward I. Espy, Pittsburgh; Robert R. Stalnaker, Denver; Richard G. Daniels, Washington; Cyril L. Griesbaum, St. Louis; Douglas J. Nankervis and Daniel J. Miller, Chicago; Lawrence R. Keenan, East Orange, N. J.; Paul E. McKenzie, Miller, Chicago; Lawrence R. Keenan, East Orange, N. J.; Paul E. McKenzie, Louisville; Donald D. Russell, Twin City; Edgar M. Corson, Milwaukee; Harry F. Odgen, Dallas; William S. Stroud, Knoxville; Louis D. Gercken, Charlotte; Harry L. Kay, Richmond, and John R. Morrison, Greenville.

The following have been reassigned: Richard B. Winchester to Rochester; Robert A. Wolfe, Albany; Ed H. Fiedler, Indianapolis; Louis C. Schultz, Peoria; Clarence W. Swanson, Des Moines; Ralph Brogie, San Francisco; and Fred Akerson, Boston.

The Pennsylvania Salt Manufacturing Company has formed a new sales department, the Industrial Chemicals Department, combining the former Heavy Chemicals and Special Chemicals Departments.

The new department will be headed by Albert H. Clem, formerly Assistant to the Vice-President in Charge of Sales. District Sales Managers are: Philadelphia, J. M. Davidson; Paterson, N. J., C. M. McCloskey; Detroit, Donald Macfarlan; Pittsburgh, W. P. Snelsire; Chicago, John C. Hampson; Cincinnati, Donald W.

Start Clean...

Stay Clean!

Smart sailor!—he won't risk what it cost to clean his "whites." Neither will the smart plater risk the time, labor, and expense of cleaning work for plating by putting the clean metal into a bath of questionable purity.

Start clean . . . *stay* clean! Red Label Darco S-51 adsorbs—takes out—the impurities that cause trouble in plating baths . . . takes them out of the bath before they can be deposited on the freshly cleaned surface of your work.

Red Label Darco helps you save on scarce anode metals . . . helps you do a better job with thinner deposits and reduce rejects.

With clean metal... keep the Bath Clean

Red Label Darco S-51 is especially treated for use in plating—the only carbon that meets the benzol-mercury test! It is especially easy to handle . . . it wets easily to make a slurry. Order Red Label Darco S-51 today. Practically all suppliers carry Darco in stock—don't accept substitutes.

DARCO DEPARTMENT
ATLAS POWDER COMPANY
Darco General Sales Offices
60 East 42nd Street, New York 17, N. Y.

ACME *Automatic Polishing and Buffing Machines*

ACME Semi-Automatic BUFFING "J BENDS" in 1911 . . . Acme successfully pioneered automatic high production buffing over 40 years ago. The above photo shows an early Acme Semi-Automatic cutting costs in 1911!

The Illustration at right . . .

shows an Acme Type B-10 Semi-Automatic of 1951. It is shown equipped with patented geared chuck and timer control used for finishing faucet bodies. This is one of a varied line of Acme Semi-Automatics adaptable to a wide range of production work.

REPRESENT NEARLY HALF A CENTURY OF PROGRESSIVE DEVELOPMENT . . .

The Acme Automatic you install today represents the cumulative experience of nearly fifty years of automatic machine design in this specialized field . . . an assurance of proved performance in YOUR plant.

The high production achieved at low cost by Acme Automatics protects both profits and production schedules . . . and conserves high cost man-hours particularly when manpower is becoming a problem, as it is today.

ROTARY STRAIGHT LINE SEMI-AUTOMATIC AND SPECIAL *Polishing and Buffing Machinery*

CATALOGS ON REQUEST

ACME *Manufacturing Co.*
1645 HOWARD ST. DETROIT 16, MICH.
Builders of

PICTURES WORTH 1000 WORDS

PROMAT STABILIZED ZINC
after 200 hour salt spray test

THE TEST: Promat additive C-42 in zinc plating bath *followed by Promat 2080* (20-1 dilution) in a simple secondary dip. Exposed 200 hours in salt spray.

RESULTS: No white corrosion or red rust. Only a slight stain apparent.

UNTREATED ZINC PLATING
after 200 hour salt spray test

THE TEST: Promat additive C-42 in plating bath followed by 1/2% Nitric Acid dip. Exposed 200 hours in salt spray.

RESULTS: White corrosion apparent at 19 hours, heavy at 200 hours. No red rust.

HERE is proof that Promat stabilized zinc answers the need for protective finishes on both civilian and military items. Promat 2080 is an O. D. type finish. It can be used from 20 to 80 concentrate depending on color and amount of chrome deposit required. Promat 2080 finish complies with U. S. Army Specification 57-0-2c, Amendment 2, and Navy Ordnance Specification 1374. In addition to providing excellent corrosion resistance, low cost Promat secondary treatments make the surface paintable as well. Bright, semi-bright, dull and olive drab finishes are available.

It will pay you to find out about new things from Promat — preparation, plating and secondary treatments that give zinc new importance.

SEND FOR THIS FOLDER
describing Promat products for better zinc plating.

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PROMAT DIVISION
Poor & Company
851 S. Market Street, Waukegan, Ill.

DISTRIBUTORS

BART-MESSING CORP.
Belleville, New Jersey

REYNOLDS-ROBSON SUPPLY CO.
Philadelphia, Pa.

ARDCO, INC.
Chicago, Illinois

Industry News

Graham, and Appleton, Wis., C. H. Anderson.

William J. Hennessy, formerly Special Chemicals District Sales Manager in Pittsburgh, has been appointed Sales Supervisor for industrial cleaners at the Philadelphia office.

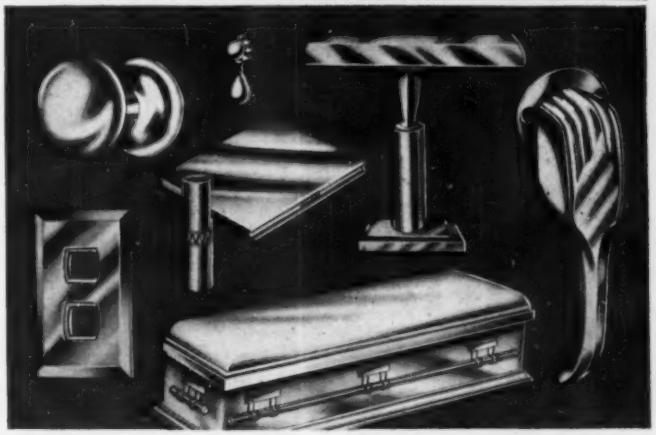
Detrex Sales Meeting. To assist manufacturers in the conservation of critical items through an intensive service program, the field representatives and managers of Detrex Corporation have just held a series of meetings in Detroit. Latest manufacturing procedures and finishing specifications for defense materiel, as well as new product developments, were thoroughly covered.

United Buff Products Corporation has announced the completion of a new, modern manufacturing plant at 233–241 Oak St., Passaic, N. J. The full production capacity of this factory will be utilized in the manufacture of "Airflow" buffs and "Aircon" contact wheels, starting with raw materials at one end of the building and ending with shipment of the finished products at the other.

Hagan Corporation and its subsidiaries, **Hall Laboratories, Inc., Calgon, Inc.,** and **The Buromin Company** have established a new district office at 1463 Monadnock Building, 53 W. Jackson Blvd., Chicago 4, Ill. The Hagan Corporation was formerly represented in Chicago by **Burke & Colston.**

The DeVilbiss Company recently assembled all its district sales managers and field engineers at the main plant in Toledo, Ohio, to review the 1951 sales program and determine what further steps could be taken to achieve the greatest degree of standardization in engineering, manufacturing and sales of products. Since 1888 the company has pioneered in the manufacture of devices for putting air to work. The DeVilbiss line includes spray finishing equipment, air compressors, exhaust systems, hose and connections.

Job Platers Meet. The semiannual meeting of the Board of Directors of the National Association of Metal Finishers, Inc., an organization of job-shop electroplaters, was held in the Stevens Hotel, Chicago, on January 27. The meeting was held in conjunction with the Annual Banquet and Educational Meeting of the Chicago Branch of the American Electroplaters' Society. Those present were (seated, reading clockwise): W. O. Zinn, President NAMF, Chicago, Ill.; A. Betteley, Treasurer NAMF, Detroit, Mich.; W. F. Walton, Vice-President NAMF, Attleboro, Mass.; A. Huber, Detroit, Mich.; H. E. Coombes, Pasadena, Calif.; D. J. Griffin, Vice-President NAMF, Birmingham, Ala.; R. Giesel, Chicago, Ill.; J. Nelkin, Brooklyn, N. Y.; G. M. Long, Philadelphia, Pa.; J. Hilfinger, Toledo, Ohio; A. E. Torney, Chicago, Ill.; E. T. Brown, Los Angeles, Calif.; W. Knight, Detroit, Mich.; G. Burgess, Detroit,



NOW...simulate copper, brass and bronze on products like these with M & W PLATELUSTRE

Don't let critical metals put a *needless* crimp in your production!

Take zinc or steel—apply a coating of one of the new PLATELUSTRE finishes. You wind up with products and parts that look so much like copper, brass and bronze that *the eye can scarcely tell the difference!*

Whether you have been using now unavailable copper and its alloys for *making* products or for *plating* products, you will find these new M & W finishes *equally* effective in keeping your plant running. There are types for air-drying and baking schedules—pick the one that best fits *your* production requirements.

Let an M & W Technical Service Engineer show you—*right in your own plant*—how easy these PLATELUSTRE coatings are to use, and what striking effects they produce. Or, if you prefer, write for free literature.

PIONEERS IN PROTECTION

75th ANNIVERSARY 1876 M&W CO.

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Right now is the time to act! Take steps toward preventing costly production delays in the future. Specify corrosion-resistant saran lined steel pipe! You'll find, as have many of the country's leading manufacturers, that this remarkable pipe means dependable long term operation at a minimum maintenance cost. Saran's unusual resistance to most chemicals and solvents plays an important part in the reduction of shutdowns and lost production. Another noteworthy advantage is its ease of field fabrication involving NO costly delays with special tools or handling.

These advantages are all important to you, so "quit worrying and do something." For detailed information mail this coupon to The Saran Lined Pipe Co.

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International Rectifier Corporation, in order to meet increased production requirements, has added a second story to

its plant at 6809 S. Victoria Ave., Los Angeles 43, Calif. This firm manufactures selenium rectifiers and photocells.

The Cro-Plate Company, Hartford 5, Conn., hard-chromium platers and manufacturers of chromium plating equipment and wet blasters, has recently moved to a new building.

Tin Spectrographic Standards Available. The National Bureau of Standards recently added new spectrographic standards to its list of analyzed

WANTED

Manufacturer's Agents in certain areas to sell McKEON'S "ZINC BRITE," world's most effective cleansing and purifying agent for cyanide zinc plating solutions. Liberal commission. Excellent cooperation. *Write:*

SULPHUR PRODUCTS CO.
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CHEMICAL ENGINEER

Thoroughly experienced in all types of electroplating processes and control. Also metal cleaners and buffing compositions.
Ferrous and non-ferrous metallurgy, lacquers, enamels, detergents, and specialties.
Formulations, development, and technical service experience. Available full time or consulting. Excellent references. *Reply to:*

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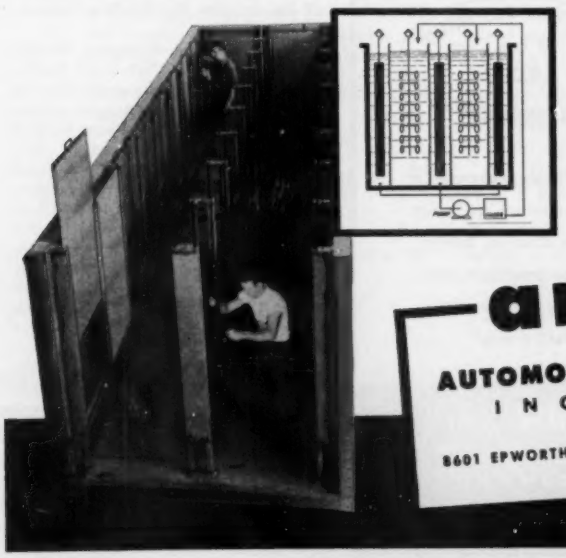
all

PLATING SOLUTIONS

FOR *QUALITY*
UNIFORMITY
SMOOTHNESS
ECONOMY

Diaphragming is the advanced plating process that segregates the anolite from the catholite by means of a canvas screen between the anode and cathode compartments and provides for filtering insoluble particles from the plating solution.



'Phone or write us requesting a consultation with one of our Diaphragm engineers. They can advise you concerning new equipment or the possibility of converting your present equipment. These men have led the industry in making the Diaphragming principle practical and available. No obligation.

A booklet which comprehensibly discusses Diaphragming is available on request.

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INCORPORATED

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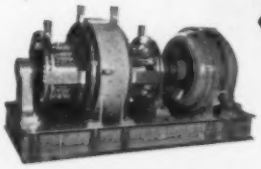
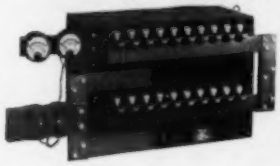
COLUMBIA



MOTOR GENERATORS
for Electroplating Anodizing,
Electrocleaning, Electropolishing



TANK RHEOSTATS
- REVERSING SWITCHES
- TONG TEST AMMETERS

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COLUMBIA ELECTRIC MFG. CO.
4533 HAMILTON AVE. • CLEVELAND 14, OHIO

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BUFFS by Williamsville are dependable in quality—tailored-to-task to meet your particular needs in coloring, cutting, and polishing—at lowest possible operating cost. Whatever your problem, let us give you the thrifty solution now!

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DANIELSON, CONNECTICUT

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Industry News

standard samples. They include new tin standards 431 to 435 inclusive (rods 4 in. long; ¼ in. diameter) and 831 to 835 inclusive (rods 2 in. long; ½ in. diameter) with provisional certificate of analysis for copper, lead, arsenic, antimony, nickel, zinc, silver, bismuth, cadmium, and cobalt.

New A. S. T. M. Technical Committee on Methods of Atmospheric Sampling and Analysis. A new technical committee, which is to concentrate its work on the formulation of methods of atmospheric sampling and analysis, the selection of acceptable nomenclature and definitions, and the stimulation of research to accomplish the foregoing purposes, held its organization meeting at the Headquarters of the American Society for Testing Materials in January. Dr. L. C. McCabe, Chief, Air and Stream Pollution, U. S. Bureau of Mines, Washington, D. C., Chairman of the new Committee D-22, presided.

The Masters Electro-Plating Association in New York City, at its annual meeting in January, elected the following members to the Executive Committee for the ensuing year: Frank Kaiser (Chairman), L. I. Mechanical Plating Company, Inc.; Irving Berkman, Berkman Brothers; Joseph F. Brust, Brust Brothers; Charles Dietrich, Dietrich & Sons; John J. Fannon, Muller Art Plating Works, Inc.; Jesse Goldman, Grand Chromium Plating Corporation; L. A. Kornblum, Kings Electroplating Company; Samuel P. Levy, R. Plumacher & Sons, Inc.; Julian Nelkin, H. Nelkin, Inc.; Philip Sievering, Philip Sievering, Inc.; John J. Walsh, Tri-Boro Electroplating Company.

Metal Coating Stripping Service. Stratford Company, Dept. Q, 207 Bay St., Bridgeport, Conn., has announced the development of a new stripping process for removal of metal coatings, which it utilizes to do custom stripping. It is stated that chromium, nickel, and copper can be stripped from zinc-base alloys, aluminum, copper, brass, or steel without etching or pitting of the base metal. Zinc die-castings are stripped cleanly so that they can be rebuffed to a high lustre by means of only a wheel wipe. Customer's samples are processed free. The process is not for sale.

Foxboro Opens Knoxville Office. A new branch office of The Foxboro Company has been opened at 618 W. Church Ave., Knoxville 16, Tenn. Marvin L. Cleaton, Jr., formerly in charge of the company's office at Columbus, Ohio, has been transferred to become Branch Manager at Knoxville. Until now, manufacturers in the Knoxville area have been served by the Foxboro office in Atlanta.

always better . . . better all ways . . .

New

✓ better than ball anodes

● **Flat-Top, the premium copper anode at a popular price, is SMOOTH! No gates or flash to hang on basket.**

● **Flat-Top has Greater Area. From 20 to 25% more effective area than the ordinary ball. More metal, less frequent loading.**

● **Flat-Top is Pure. No cavities to hide inclusions of copper oxide, silica or dirt. Manufactured from highest purity copper.**

✓ better than oval anodes

● **Flat-Top is "Good to the last molecule!" No waste, no annoying scrapping of "swords" and hooks. 100% efficiency.**

● **Flat-Top is Predictable! Eliminates rapidly changing anode area as ovals corrode, decreasing sludge formation and rough plating.**

● **Flat-Top is Ready! No delay, no extra costs of fabricating and attaching hooks. Load your tanks right from the keg.**

✓ and copper Flat-Top is . . .

● **CLEAN! Packed in new durable wooden kegs, protected from contamination of battered, used drums.**

● **CONVENIENT! Keg is safe to stack, easy to roll or truck. And all these PREMIUM FEATURES with substantial savings for you!**

Pass the Copper Flat-Top folder among the cost-conscious members of your organization. Just mail the coupon attached to your letterhead and you'll receive your copy. We'll also deliver a Gold Plated Copper Flat-Top paperweight — while our supply lasts.

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Send me a copy of your folder, the name of Wagner Brothers' representative in my area and a Gold Plated Flat-Top Paper Weight.

Name..... **Title**.....

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chromic acid

99.75% PURE

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THE TRUE INSULATOR

is specifically manufactured to insulate your plating operations from grounds and short circuits through the heating coils, cooling coils, air agitation systems or other pipe connections. The True Insulator provides more positive insulation than any other type known.

Available in following sizes

½ inch.....$7.00 per pair
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Personals

A. W. Hothersall of the Ministry of Supply, Armament Research Department, Woolwich Arsenal, London S. E. 18, England, well known for his many contributions to electroplating knowledge, has been experiencing a period of ill health and is in a hospital for treatment. His many friends will wish him a speedy recovery.

George R. Woleben was recently appointed Cowles Technical Man to handle sales and service work for the Metal

Woleben

Cleaner Department of Cowles Chemical Company in New York State. He is a graduate of Fredonia State Normal School and received additional academic instruction, mostly in temperature-control work, in the Research Laboratories of Leeds & Northrup Company. Before coming with Cowles, he was employed as a Metallurgical Microscopist by Allegheny Ludlum Steel Corporation.

Dr. Bruce W. Gonser has been appointed Assistant Director of Battelle Institute, Columbus, Ohio. He will guide development of Batelle's enlarged program in up-to-now unexplored fields of metallurgy and chemistry of the less common metals.

Dr. Gonser graduated from Purdue University in 1923 with a B.S. degree in chemical engineering. He received a M.S. degree in metallurgy from the University of Utah in 1924, a professional degree in chemical engineering from Purdue in 1930, and his doctorate in nonferrous metallurgy and metallography from Harvard in 1933. He joined the Battelle staff in 1934 as supervisor of research in nonferrous metallurgy. Before that he was successively associated with the American Smelting and Refining Company, the Superior Zinc Corporation, and the National Radiator Corporation.

Richard C. Hedke, Vice-President and General Manager of Eaton Chemical and Dyestuff Company since 1920 and an employee for 43 years, was promoted to Executive Vice-President at the Directors' annual meeting on February 10. Other promotions included **Gerald T. McCray**, Manager of the Industrial

Technical Notes from Du Pont on ELECTROPLATING

How to prevent blistering in zinc plating

Blistered deposits in cyanide zinc plating usually are caused by foreign matter, either on the work or in the bath. The size, type and location of blisters often indicate the source of trouble.

Large blisters, having about the same ductility as normal zinc, and appearing at random on the cathodes, often result from unsatisfactory cleaning of the work. To stop this type of blistering, check up on your electrolytic cleaning, acid pickling step, or both.

Very small, brittle blisters, on the corners and edges (high current density areas) of the work, usually are caused by certain foreign metals in the bath, such as hexavalent chromium or molybdenum. Here are three ways to correct this type of blistering:

1. Sodium Hydrosulfite Additions

As a temporary corrective for blistering caused by *hexavalent chromium*, add sodium hydrosulfite to the bath. This reduces the chromium (but not molybdenum) to the trivalent form in which it is not detrimental. Frequent additions may be necessary until you can take time for electrolytic purification or zinc dust treatment. Add the hydrosulfite as a solid in amounts of 0.001 to 0.01 oz./gal., while stirring the electrolyte vigorously.

2. Electrolytic Purification

High current density electrolysis is the method recommended for reducing either hexavalent chromium or hexavalent molybdenum to the trivalent form and removing these metals from the bath (by co-deposition with the zinc). To do this, operate the bath at 50-75 A/SF, using large steel panels as cathodes, until blistering stops. Then, it's advisable to analyze the bath and restore it to optimum chemical composition.

3. Zinc Dust Treatment

Where molybdenum is normally used as an addition agent in the zinc bath, high purity zinc dust can be used to keep the molybdenum reduced to the trivalent form in which it gives best results. Commercial experience has shown that the zinc dust treatment reduces chromium to the trivalent form, too.

It's best to treat the plating solution in a spare tank, using 0.1 oz./gal. zinc dust. Stir the solution vigorously at intervals during the treatment. Then filter the solution back into the plating unit. Since this treatment takes ten to twelve hours (unlike treatments for removal of lead and cadmium), a good treating time is overnight, or on a week end.

The above technical information is offered in the interest of increasing production through efficient operation and proper use of materials. In these critical times, Du Pont Technical Service stands ready to help you with your problems. For additional information and technical help without obligation, contact the Du Pont Electrochemicals Department district office nearest you. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington, Delaware.

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BLAKESLEE SOLVENT VAPOR DEGREASERS
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Stabilized Degreasing Solvent — one price, one solvent *for all metals*

Blakeslee's new washer saves labor, is economical

Just one man can keep the production line going with this time saving metal parts washer. Turn table operation permits loading and unloading in one easy pivot movement. One revolution of the washer turn table and parts come out sparkling clean for a better finishing job with fewer rejects. Blakeslee washers are designed for every type and size of plant operation. Write for the cooperative services of our engineer-trained sales representatives.

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Personals

Chemical Division, to a Vice-Presidency and **Rotheus P. Cole**, Manager of the Dyestuff Division and Chief of Research, to the Secretaryship. **Howard J. Vetenko** became Chief Chemist.

Wallace B. Phillips has been elected president of Pyrene Manufacturing Company, Newark, N. J. He succeeds **Edward J. Waring**, who, upon his retirement in August, 1950, had served the Company for almost forty years as Treasurer, Vice-President and President.

Phillips

Mr. Phillips has been a member of the Pyrene organization since 1913. In January of that year he was one of three associates who formed an agency to sell Pyrene fire extinguishers in Europe, Africa and the Far East. In February, 1914, this agency was absorbed into The Pyrene Company Limited, of England, then established, and of which Mr. Phillips has been Chairman and Managing Director since its incorporation.

Joe Hart has been appointed Manager of the Metal Processing Sales Division of Turco Products, Inc. A graduate of the

Hart

University of Illinois and a veteran of World War I, Mr. Hart has had varied experience in the industrial chemical field for over twenty-five years.

Robert T. Griebling, a Fellow of Mellon Institute, has been appointed Executive Secretary of the Air Pollution and Smoke Prevention Association of America, Inc. The headquarters of the association, hitherto located in Chicago, will be moved to Pittsburgh and will be housed in Mellon Institute, which has pioneered in research on urban and communal smoke control since 1911.

The new executive secretary, a graduate of the University of Wisconsin, has been interested in public health problems

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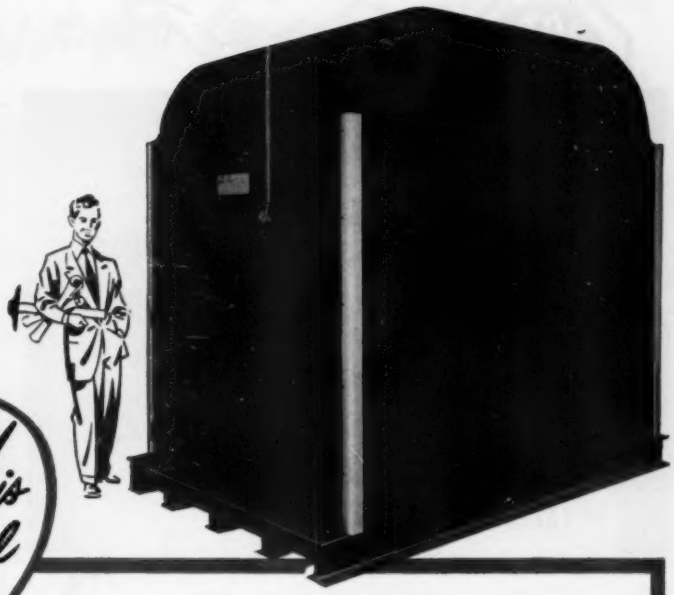
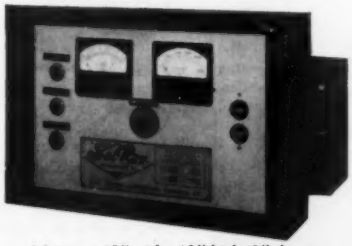
...builds the world's largest single unit selenium rectifier!



Automatically controlled by this operating panel



Measures 18" wide, 12" high, 8" deep.

ADVANTAGES

- Completely sealed against corrosion.
- Exceptionally high efficiency.
- Power factor — .93 lag.
- Smooth output control.
- Automatic voltage stabilization ∓ 2%.
- Prompt delivery.

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Illustrated above is a 13,000 ampere, 14 volt selenium rectifier complete with saturable reactor control. It is one of 5 units recently installed in the plant of a prominent automobile manufacturer.

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General Supply Company
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Lea Products Company
996 DeBullion Street, Montreal, Quebec

The W. D. MacDermid Chemical Co.
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J. C. Miller Company
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- You buy nothing until our analysis proves results will benefit you.
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- Roto-Finish Engineers make periodic visits to your plant to supervise and demonstrate the use of Roto-Finish processes, to train your operators, and offer helpful suggestions to improve your products wherever possible.
- The Roto-Finish Company manufactures their own materials so they can control the uniformity of quality and size — another reason why it is possible for Roto-Finish to guarantee results.

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ORIGINATORS OF THE ROTO-FINISH PROCESSES

Personals

for more than 10 years, and assisted in the Industrial Hygiene Foundation since 1942. He has served various industries in a public-relations capacity, and was director of public relations of the Allegheny County Sanitary Authority following its inception in 1946.

Edwin Vereeke is now Sales Manager of the Heil Process Equipment Corporation, Cleveland, Ohio. He was formerly District Sales Supervisor.

Vereeke

Robert Peters, formerly Estimating Engineer, has become Sales Engineer for the area west of Cleveland, and **Ken Grader** is Sales Engineer in charge of the area east of Cleveland. Mr. Grader, formerly of Philadelphia, will make his headquarters in Cleveland.

L. E. Detre, formerly of Greer Steel Company, Dover, Ohio, is now Superintendent of Production of Enamel Products & Plating Company, McKeesport, Pa.

H. B. Conrad, formerly Assistant to the Manager of The Diversey Corporation's Southwestern Division in Kansas City, has been promoted to Manager. He began with Diversey in 1942 as a represen-

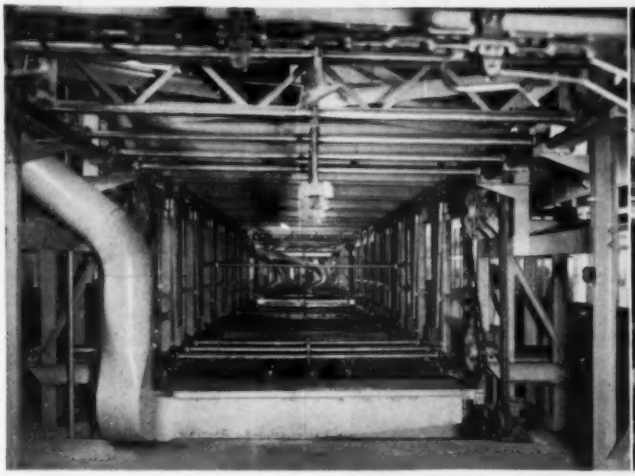
Conrad

tative in the Farm Quality Control Department and advanced rapidly to Senior Salesman, then to District Manager in the Southern Division, the position he held a year ago when he became Assistant to the Manager of the Southwestern Division.

Ralph M. Hunter and **Marvin J. Udy** have been elected President and Vice-President, respectively, of The Electrochemical Society.

Born in Philadelphia, Pa., on August 18, 1896, Dr. Hunter received the B.S.

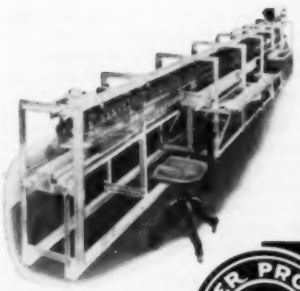
in your plating How to Get Greater Production Improved Quality Better Working Conditions



Typical Meaker Straight-A-Way Automatic Plating Machine. This type unit is designed to handle 125 racks or more per hour.

Meaker Return-Type Automatic Plating Machine for chromium-plating the large variety of parts in a high-quality line of plumbing hardware. Machine may be designed to copper plate, nickel plate and chromium plate in one continuous line.

A Meaker Semi-Automatic Plating Machine for use in medium-output plating departments and also for supplementing the plating operations in a Full Automatic which performs the cleaning, preplating operations, final rinsing and drying.



A special machine designed by Meaker for cleaning and silver plating small, brass contact clips.

You Get All Three with Meaker

Here's how! A Meaker plating machine makes every operation in the plating sequence automatic, or as mechanized as possible. This cuts to a minimum the manual handling of the parts in process—increasing production. The control of the quality of the plating is set and practically independent of the varying human element. A Meaker plating machine does clean up the plating room making for safer and more agreeable working conditions. And a bonus—in many cases the savings in the over-all plating costs have paid for the equipment in a short time.

Look to the handling methods in your plating department. You might be surprised what modern methods will accomplish. Whatever your requirements—full automatic, semi-automatic, or a special machine—Meaker has the answer.

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Serving the Plating Industry for Over 50 Years

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Personals

degree in Chemical Engineering from Case Institute of Technology in 1918 and an honorary degree of Doctor of Engineering in 1950. He became associated with The Dow Chemical Company in 1918 and now manages its Electrochemical Division, is Director and President of the Midland Ammonia Company, and Director of Dow Chemical of Canada, Ltd.

Mr. Udy is a native of Utah and a graduate of the University of Utah, class of 1915. The next year he received the M.S. degree from the same school. Following connection with U. S. Mining and Smelting Corporation and Hooker Electrochemical Company, he became chief chemist and research engineer of the Haynes Stellite Company. While there he developed a process for cadmium plating, the patents for which formed the basis of The Udylite Corporation, now of Detroit. Mr. Udy was later with the Electrometallurgical Company, the Swann Chemical Company and Oldbury Electrochemical Company. Since 1937 he has been consulting engineer for the Chromium Mining and Smelting Company, developing a process for treating low-grade chrome ores. He is also consultant for other companies. He was the recipient of the Schoellkoff Medal in 1948.

C. W. (Bill) Parker, Managing Director of Vab Plating Company, Ltd., London, England, since the company was formed, is starting a new plating business in Reading, 36 miles from London, with his wife and son as co-directors. Parker has severed all connections with his old firm, which he managed for 18 years. He is a newly elected member of the Council of the Electrodepositors' Technical Society, England.

How to Reduce Rejects to New Low in Bright Nickel Plating on Steel

. . . with Important Savings in Cleaner Costs!

A TYPICAL CASE HISTORY:

Parts: **Elements for Loose-Leaf Books.**

Application of Cleaners: **Direct and Reverse Current Cleaning.**

FORMER CLEANERS		MAGNUS CLEANERS	
Tank Charge	16 oz. per gal.	*Tank Charge*	15 oz. per gal.
Make-up	30# per day	Make-up	12½# per day
Tanks Dumped	Every 2 wks.	Tanks Dumped	Every 6 wks.
Cost per lb.	8¢	Cost per lb.	15¢
Cost per day	$7.00	Cost per day	$2.90
Rejects	60%	Rejects	3%

Data from Product Application M202.7-49 11/25/49.

Lower costs . . . no caustic fumes . . . better plating. Ask us for recommendations on YOUR cleaning jobs.

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Clinton H. Murray, formerly Chemist with Hollensak Optical Company, Rochester, N. Y., is now Plating Engineer with Industrial Plating Co., Fort Worth, Texas.

Dell M. Ramsey, Works Manager of the Tonawanda plant, and **Samuel F. Walton,** Technical Director, have been

Ramsey **Walton**

elected Vice-Presidents of the Exolon Company, manufacturers of aluminum oxide and silicon carbide abrasives.

H. A. Fudeman of Trico Products Corporation, Buffalo, N. Y., has been advanced from Process Engineer to Supervisor of Metal Finishing. Mr. Fudeman is very active in the affairs of the Buffalo Branch of the American Electroplaters' Society, serving as its Secretary and as Program Chairman for the 1951 Convention.

R. W. Schwartz has transferred from Production Machine Company's home office in Greenfield, Mass., to become sales and service engineer in Ohio, western

Schwartz

New York and Pennsylvania, and northern Kentucky and West Virginia. He will work closely with Production distributors and with manufacturers of abrasive products.

William F. MacDonald has been elected President of the E. F. Houghton & Company of Canada, Limited, Toronto, succeeding the late G. W. Pressell. **E. H. MacInnis** continues as Vice-President and Sales Manager in the Toronto headquarters, 100 Symes St.

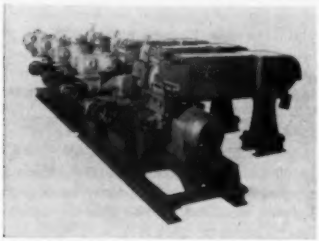
Obituary

Eugene C. Sumereau died recently at the age of 70. He was the head of the firm of Eugene C. Sumereau and Sons of New York, now located in Huntington, L. I., and a member of the Masters' Electro-Plating Association, New York City.

Trade Literature

L—590. Centerless Polishing Machine—Production Machine Company, Greenfield, Mass., has announced a High Speed Centerless Polishing Machine, described in a 6-page illustrated Bulletin No. 5.

Shown in public for the first time at the Chicago Metal Show a tandem installation of these machines was demonstrated



on welded steel tubing at 70 lineal feet per minute. Up to the present time such speeds for polishing cylindrical work was considered fantastic. Yet these machines will produce nearly any desired finish if a sufficient number of machines are used in the installation. Design features include a large wheel spindle with capacity for contact wheel or buffs up to 6 inches wide. The machines are usually installed in tandems of from two to six units. The attached photograph illustrates a typical installation of four machines, the first three equipped with idler backstands and the fourth arranged to use a buff for final operation. Adjustable roller fixtures are provided to support the work as it automatically passes from one machine to another. For your copy, use Reader Service Card.

L—591. Steam Valve and Butterfly Valve Sizing Charts—A Steam Valve Sizing Chart covering the range from 1 to 1,000,000 lb/hr and a Butterfly Valve Sizing Chart covering the range of 15 to 10,000 gal/min have just been published by the Fischer & Porter Company, Hatboro, Pa. For your copy, use Reader Service Card.

L—592. Black Oxide on Steel—Empire Solvents, Inc., 153 E. 26th St., New York 10, N. Y., has issued a booklet describing its Empire Black process for applying black oxide to steel and iron. The advantages of this finish are listed. For your copy, write on your company's letterhead and mention PLATING.

L—593. Universal Steam Trap—Velan Engineering Company, 1 Exchange Place, Jersey City, N. J., and 1216 Drummond St., Montreal, Canada, offers the Velan Universal Steam Trap of radically new design. This compact unit weighing 8½ lb has the capacity and efficiency of ordinary 2-inch traps weighing up to 200 lb.

Seven different devices are combined: (1) steam trap, (2) air-bypass valve, (3) check valve, (4) self-cleaning strainer, (5) flow-control glass, (6) temperature-indicator gauge, and (7) temperature control.

It can be installed in any position without affecting its efficiency. The valve is opened by steam pressure and closed by thermal action, which is a completely new method of steam-trap operation. For your copy of descriptive catalogue, use Reader Service Card.

L—594. Choice of Equipment Material—This subject is discussed in a bulletin, "Corrosion and Its Allies", under the headings, Operating Conditions (concentration, temperature, pressure, movement, aeration, films, contamination, and liquid level) and Construction Conditions (surface finish, heat effect, concentration cells, stress, and galvanic couples). Issued by Storts Welding Company, 42 Stone St., Meriden, Conn., your copy may be obtained by using the Reader Service Card.

L—595. Cleaner Conservation—Pennsylvania Salt Manufacturing Company, Special Chemicals Department, 1000 Widener Bldg., Philadelphia 1, Pa., offers a service sheet, "Metal Cleaner Conservation Tips", which gives five rules for reducing cleaner usage. For your copy, use Reader Service Card.

L—596. Protection of Aluminum—A 4-page illustrated bulletin, "Alodizing Protects Aluminum and Its Alloys", has been issued by American Chemical Paint Company, Ambler, Pa. Pictures of salt-sprayed panels with different surface

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for setting up wheels, belts and rolls

HARRISON & COMPANY, Inc.
HAVERHILL, MASSACHUSETTS

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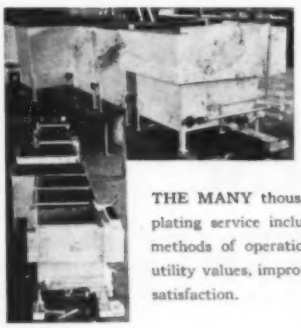
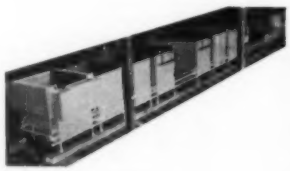


STORTS has the answers

THE MANY thousands of Stortswelded tanks now in plating service include all types and all sizes—for all methods of operation—all of them featuring long life utility values, improved plating conditions and complete satisfaction.

For single tanks or complete tank cycles, consult freely with Storts engineering staff on matters of design. The cost of being right is small compared to the possible savings in maintenance and replacement.



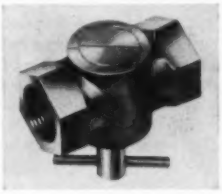
42 STONE STREET — STORTS WELDING COMPANY INCORPORATED — MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

treatments, with and without painting, illustrate the value of the process. Characteristics of the Alodine coating are given, and a flow sheet shows its application. For your copy, use Reader Service Card.

L—597. Waste Water Treatment—The Finishing Lime Association of Ohio, Home Bank Building, Toledo 4, Ohio, has issued a 12-page illustrated bulletin, "Lime, the Low-Cost Way to Prevent Stream Pollution". It describes, with flow charts, neutralization of pickling waste with dolomitic lime, and the use of lime in some steps of the treatment of plating wastes and oil emulsions. Data are given on composition of dolomitic lime and its availability. For your copy, write to the Association and mention PLATING.

L—598. Flow-regulating Valve—The Reynolds Shaffer Company, Dept. Y-12, 12100 Cloverdale Ave., Detroit 4, Mich., announces the Reynolds Flow-regulating Valve, a stop cock for use where an exact flow of water, or other liquids, is required. It can be used for jet pumps and spray pumps, as a by-pass valve on boiler-feed



lines, or any place where a quick-opening, easy-operating flow-regulating valve or stop cock is needed.

Features include: (1) finger-tip operation; (2) one-quarter turn opens or closes; (3) all-brass construction with close fit (Bearenized finished to 0.0005 inch); (4) positive "O Ring" packing will withstand almost any pressure and will not leak; (5) can be assembled or disassembled in 30 seconds. For your copy of bulletin giving complete information and specifications use Reader Service Card.

L—599. Chromium-like Bright Finish—A technical bulletin on the use of zinc plate and Iridite chromate chemicals to replace conventional chromium plating has been released by Allied Research Products, Inc., 4004-4006 E. Monument St., Baltimore 5, Md. The bulletin describes the use of the chemicals in such finishing systems, and makes comparisons of the appearance, corrosion resistance and abrasion resistance of the finished surface. For your copy, use Reader Service Card.

L—600. Corrosion-resistant Fittings—These are described in an 8-page Speedline Fittings booklet published by Horace T. Potts Company, Erie Ave. and

News about UNICHROME Trade Mark

COATINGS for METALS

How to continue chromium plating of zinc die castings

If you can't use copper and nickel, you can plate chromium directly on zinc die castings. When plated directly on castings, the chromium is usually gray and dull, but brightness can be brought up by buffing. You'll find direct chromium plating a practical operation on simple, easy-to-buff shapes—especially with Unichrome S.R.H.S. Chromium Solution which plates brighter on castings than ordinary chromium baths.

A deposit thicker than usual is required to avoid buffing through to the base metal. And baking on of Unichrome Coating B-115 is highly recommended for extra protection against dulling in service.

Yes... rack coating helps you conserve

Don't overlook the sizable contributions toward conservation of labor and materials made by a superior rack coating such as Unichrome Coating 218X. By its ability to maintain a smooth, free-rinsing, damage-free surface in all baths, it not only requires less maintenance, but also reduces contaminatory drag-in and wasteful dragout of plating metals.

Electrolytically-produced conversion coating speeds parts for defense

Like anodizing, the Anozinc* process for zinc plate uses current to form a tougher and more corrosion resistant finish. It dovetails with the zinc plating set-up, permitting fast, continuous processing of such parts as shell casings, die castings and propeller blades.

* Trade Mark

You can still do BRIGHT FINISHING

Here's how to keep on giving many consumer products sparkling chromium plate

Whether you are able to use copper and nickel or not, you can turn out bright metal finishes. If you can undercoat with these metals, be sure to follow up with Unichrome S.R.H.S. Chromium Plating for time- and money-saving advantages. If you can't use copper and nickel, then you still have available one of the following ways to finish:

Chromium plate, even without copper or nickel undercoatings, can be used effectively on straight chromium stainless steel. So if you can make your product from stainless, consider plating it directly in Unichrome S.R.H.S. Chromium Solution.

Unichrome S.R.H.S. Chromium needs no nickel strike on stainless. Moreover, this bath deposits its chromium 20 to 80% *faster*. It plates bright over a wider range of current densities. A self-regulating bath, it requires less supervision to keep in peak plating balance.

A LITTLE ZINC GOES A LONG WAY IN BRIGHT FINISHING

A bright finish that looks like chromium is easily obtained by zinc-plating steel products and then processing them in Unichrome Clear Dip. You don't need much of a zinc deposit either. A supply-stretching .0003" of plate is ample. Thus, pound for pound, you can plate *more* products than with other finishes, and save money besides.

The Unichrome Dip Finish resists corrosion, stays bright. It has been used for several years on ice skates, bicycle parts and refrigerator shelves. A still higher quality finish will be assured by applying a clear synthetic coating such as Unichrome Coating B-115 over the Clear Dip Finish for extra protection.

INDOOR OR SHELTERED APPLICATIONS

A 10-minute plate of chromium on ordinary steel, especially when you take advantage of the faster rate of deposition of the Unichrome S.R.H.S. Chromium Bath, can be given excellent corrosion protection for unexposed applications by coating the plate with a clear organic coating. A tough, flexible baking synthetic, Unichrome Clear Coating B-115 has been used for years because of its outstanding adhesion to chromium, its non-yellowing clarity, and its corrosion resistance.

UNICHROME Trade Mark

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Chicago 4, Ill. • Los Angeles 13, Calif.
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THE FOLLOWING EXCELLENT REBUILT AND GUARANTEED ELECTROPLATING MOTOR GENERATOR SETS AND RECTIFIERS, WITH FULL CONTROL EQUIPMENT:

1—12,000/6000 AMPERE, 12/24 VOLT, BRAND NEW **COLUMBIA**. Synchronous Motor. Complete Controls.

1—6000 AMPERE, 2-6 VOLT, **JANTZ AND LEIST**. Separately Excited. Excellent Condition.

1—6000/3000 AMPERE, 6/12 VOLT, **CHARLES J. BOGUE**. Synchronous Motor.

1—5000/2500 AMPERE, 10/20 VOLT, **HANSON-VAN WINKLE-MUNNING**. Exciter-in-Head. Synchronous Motor.

1—5000/2500 AMPERE, 6/12 VOLT, **EAGER ELECTRIC CO**. Separately Excited. Excellent Condition.

1—3000/1500 AMPERE, 12/24 VOLT, **HANSON-VAN WINKLE-MUNNING CO.** Synchronous Motor. Exciter-in-Head. Excellent Condition.

1—2000/1000 AMPERE, 6/12 VOLT, **A. P. MUNNING "OPTIMUS."** Excellent Condition.

1—1500/750 AMPERE, 6/12 VOLT, **HANSON-VAN WINKLE**. Excellent Condition.

1—1000/500 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS CO**. Separately Excited. Excellent Condition

1—2000 AMPERE, 50 VOLT, **CHANDEYSSON ELECTRIC CO.** ANODIZING UNIT. Synchronous Motor. Full Controls.

1—1500 AMPERE, 40 VOLT, **HANSON-VAN WINKLE-MUNNING CO.** Anodizing Unit. Complete Controls. Synchronous Motor. Excellent Condition.

1—1000 AMPERE, 40 VOLT, **HANSON-VAN WINKLE-MUNNING CO.** Anodizing Unit. Synchronous Motor Drive. Full Controls. Excellent Condition.

1—1000 AMPERE, 40 VOLT, **CHANDEYSSON ELECTRIC CO.** Anodizing Unit. Synchronous Motor Drive. Excellent Condition.

1—400 AMPERE, 40 VOLT **"M.G.C."** Anodizing Motor Generator Set. Exciter-in-Head.

5—**GREEN SELECTROPLATERS**, 1800 AMPERES, 12 VOLTS, for operation on 220 volt, 3 phase, 60 cycle.

1—**GENERAL ELECTRIC CO. COPPER OXIDE RECTIFIER.** 2000 AMPERES, 6 VOLTS. With 220 volt, 3 phase, 60 cycle input.

2—**UDYLITE-MALLORY RECTIFIERS**, 1440 AMPERES, 6 VOLTS, with 220/440 volt, 3 phase, 60 cycle input.

4—**GENERAL ELECTRIC COPPER OXIDE RECTIFIERS.** 500 AMPERES, 6 VOLTS, for operation on 220 volt, 3 phase, 60 cycle.

M. E. BAKER CO.

25 WHEELER STREET
CAMBRIDGE, MASS.

Trade Literature

D St., Philadelphia 34, Pa. In addition, it is shown how light-walled Schedule 5S corrosion-resistant piping reduces the cost of a typical piping layout. For your copy, use Reader Service Card.

L—601. Coated Gloves—American Rubberizing Company, 617 11th Ave., South, Minneapolis 4, Minn., has released a 4-page bulletin describing the processing of canvas and cotton knit gloves coated with natural rubber, Neoprene, or plastic. Gloves so processed include both men's and women's industrial work gloves. The bulletin gives the range of styles, sizes and colors available, plus descriptions and applications of each. For your copy, use Reader Service Card.

L—602. Blasting of Diecastings—"Wheelabrating, the Faster and Better Way to Finish Die Castings" is the title of a new booklet, No. 794, prepared by American Wheelabrator and Equipment Corporation, 555 S. Brykit St., Mishawaka, Ind. It illustrates and describes actual case histories of how diecasters have used Wheelabrating.

The three major uses of the process in the diecasting industry are said to be: (1) Achieving a slightly roughened surface that will provide a bond for finish coatings; (2) removing fine burrs and thin flash; and (3) eliminating porosity in the metal itself. For your copy, use Reader Service Card.

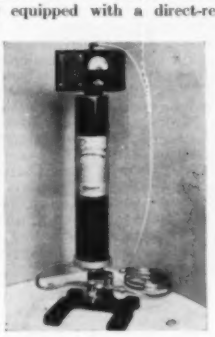
L—603. Solvent-Detergent—How solvent detergents provide outstanding benefits in hundreds of industrial cleaning applications is discussed in a 24-page illustrated booklet recently issued by Oakite Products, Inc. It gives specific uses of solvent detergents in metalworking plants and metal-finishing shops, and lists these advantages: (1) rapid dissolution and removal of heavy soils; (2) fast pre-cleaning action to make subsequent critical alkaline cleaning easier; (3) use at room temperature in most instances; (4) solutions easy to mix and ready for instant use; (5) tough soils removed without hurting paint beneath; (6) fire hazards minimized; (7) rust after cleaning prevented; and (8) economy.

Readers desiring free copies of this booklet may obtain them by addressing Oakite Products, Inc., 140 Thames St., New York 6, N. Y., and mentioning PLATING.

L—604. Neoprene Maintenance Coating—Liquid Neoprene, in the form of an air-curing maintenance coating, is described in an information sheet issued by Gates Engineering Company, P. O. Box 1711, Wilmington, Del. It gives applications and user instructions, as well as a complete description of the product. One small section tells how the coating can be easily repaired or patched. For your copy, use Reader Service Card.

L—605. Abrasives—Baystate Abrasive Products Company, Westboro, Mass., offers two literature pieces which feature fractional grades and a series identified as 8A. The latter is a grain combination offering lower initial cost, substantially increased wheel life, and cool, fast-cutting action. The former, an exclusive Baystate development, affords choice of exact degree of hardness by splitting every normal grade into three degrees of hardness. For your copies, use Reader Service Card.

L—606. Demineralizer—The Bantam Demineralizer manufactured by Barnstead Still & Sterilizer Company, 2 Lanesville Ter., Forest Hills, Boston 31, Mass., is now equipped with a direct-reading



meter which indicates water purity in parts per million and in ohms electrical resistance. It also has a needle-type regulating valve for flow adjustment, a drain valve, and a sturdy base for bench mounting. Base may be removed if wall mounting is desired. It is said to be ideal for applications requiring relatively small amounts of demineralized water. For your copy of descriptive bulletin, use Reader Service Card.

L—607. Dust Collectors—A 38-page catalog containing specifications for the complete line of standard, pretested Dustkop Dust Collectors has been issued by Aget-Detroit Company, Ann Arbor, Mich. Illustrations are included of almost every typical dry-grinding dust-control problem. Considerable space is devoted to buffing and polishing dusts.

A cross index permits the reader to locate the recommended unit, either by cfm requirement or by the general classification of the dust. Control of vapor and mist from wet grinding operations is also dealt with. Accessories—branch pipe, hose, hoods, blast gates, etc.—are illustrated and priced. For your copy, use Reader Service Card.

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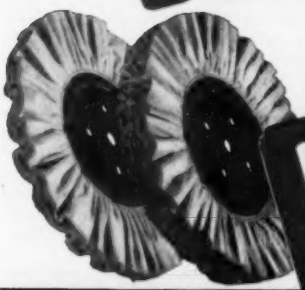

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Ventilated **NON-FRAY BUFFS**

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Investigate the real opportunity of increasing production in your plant with

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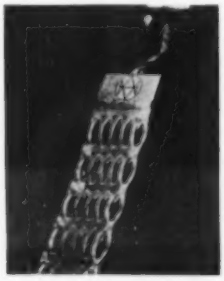
Equipment and Supplies

E—661. Chromium Plating Anode—A new type of chromium plating anode, Chrome-Flo, has been developed by the Hanson-Van Winkle-Munning Company of Matawan, N. J. The following advantages are claimed: (1) Insoluble chromate film formation on anodes is markedly reduced by use of special alloy lead, Type "S"; (2) open construction with better circulation of solution and increased useful anode surface makes possible higher current densities and thereby better covering on difficult-to-plate parts; (3) decreased weight of anodes facilitates easier handling.



It is best to keep the current on at all times when the anodes are in the bath. Anodes should be removed, rinsed, and stored in air when tank is idle. If this procedure can be followed, anodes will always be ready for use without periodic scrubbing. Anodes of this new construction can be furnished in 6 per cent antimony-lead, 7 per cent tin-lead, or any other commonly used alloy. For further information, use Reader Service Card.

E—662. Chromium Plate Direct on Steel—The unavailability of copper and nickel has forced many manufacturers to resort to the procedure of plating chromium directly on steel. Such chromium requires a durable protective coating to assure durability. Maas & Waldstein Company, Newark, N. J., Chicago, and Los Angeles, now offers an air-drying finish, DULAC Clear Universal Lacquer No. 462, or a baking finish, CODUR Clear Synthetic Y743, to meet this need. Both are said to withstand salt spray and weatherometer tests for the 800 hours without evidence of failure. For further information, use Reader Service Card.

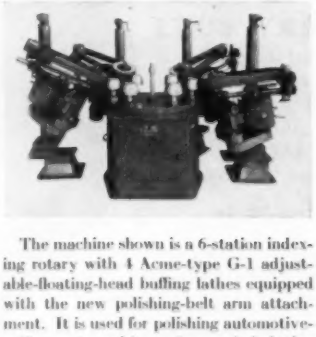
E—663. Bright Finishes for Metals—At this writing, manufacturers of metal products can still produce durable bright finishes, according to United Chromium, Inc. These finishes do not require use of either copper or nickel.

One widely adopted finish is produced with 0.0002–0.0005 inch of zinc plate, Unichrome Clear Dip, and Unichrome Baking Synthetic B-115. This finish has eye-appeal similar to that of chromium plate; it possesses the well-known protection against rusting of zinc. The durability of the finish has been proven in years of use on refrigerator shelves, ice skates, and bicycle parts. At present, the finish is being used by manufacturers of automotive, hardware, and electrical appliances.

Another finish receiving consideration is fairly thick chromium, plated directly on the basis metal (buffed in the case of zinc diecasting) and coated with Unichrome Clear Baking Synthetic B-115. The Unichrome Self Regulating High Speed Chromium Plating Bath is used, among other reasons because of its plating speed and because it plates brighter on zinc than ordinary chromium solutions.

Further information on these and other substitute finishes can be obtained by describing your finishing requirements on your letterhead, sending it to United Chromium, Incorporated, 100 E. 42nd St., New York 17, N. Y., and mentioning PLATING.

E—664. Rotary Polishing and Buffing Machine—A newly developed polishing-belt arm attachment, which is universally adjustable from horizontal to vertical positions, is said to be unusually effective in a new 40-inch Rotary Automatic Polishing and Buffing Machine developed by Acme Manufacturing Company, 1645 Howard St., Detroit 16, Mich.



The machine shown is a 6-station indexing rotary with 4 Acme-type G-1 adjustable-floating-head buffing lathes equipped with the new polishing-belt arm attachment. It is used for polishing automotive-grille parts, with a 1-second indexing interval. It can be furnished with many other features, such as geared chucks, oscillating arms, automatically locking tail stocks, vacuum chucking, and special fixtures. Stroking spindle arrangement for longer belt life, vertical power traverse, reciprocative actions, and air lift can also be provided. For further information, use Reader Service Card.

E—665. Calibration Method for Sieves—A simple, rapid procedure for determination of the effective opening size of testing sieves has been developed by V. R. Deitz and F. G. Carpenter of the National Bureau of Standards. The new method employs calibrated glass spheres of graduated size and may be readily applied without special apparatus. Use of this technique is expected to reduce markedly the discrepancies which now occur between sieve analyses made at different laboratories with different sieving equipment. The reproducibility has been shown to be about 1 per cent of the size of the sieve opening, significantly less than the 2–7 per cent variation allowed in present specifications.

A limited number of calibrated glass-sphere mixtures are available at $10.00 each from J. M. Brown, Secretary, Bone Char Research Project, Inc., c/o Revere Sugar Refinery, 333 Medford St., Charlestown 29, Mass. Purchasers are requested to report their experience to Dr. V. R. Deitz, National Bureau of Standards.

E—666. Clear Finish for Zinc—Zinc die-castings and zinc plated steel can be protected with Dulac Clear Universal Lacquer No. 462, which is air-drying, and Codur Clear Synthetic Y743, which is baked. Both stand up under salt spray and weatherometer tests for 800 hours and are manufactured by Maas & Waldstein Company, Newark 4, N. J.

Zinc die-castings protected with these coatings are said to show no discoloration even after long periods of service. For further information, use Reader Service Card.

E—667. Enclosed Two-Compartment Deburring Barrel—New convenience, efficiency and safety are claimed for the closed Deburring Barrels announced by the Belke Manufacturing Company, 947 N. Cicero Ave., Chicago 47, Ill.

Turning a hand crank adjusts the enclosed drive to any speed from 10 to 40 rpm. Other speeds available. The aluminum doors are light in weight and easily locked for water-tight closure. Wire-mesh doors are furnished to be used for draining or rinsing the work. A steel chute below the barrel guides drainage, media, or work into a tricycle dump pan with ball-bearing-equipped wheels and with funnel-shaped snout for pouring without spilling.

Model illustrated has two compartments lined with hard maple, each 22 inches wide by 29 inches across the flat surfaces. Can be furnished with 1, 2, 3 or 4 compartments. Top of the case slides down to form complete enclosure when the barrel is in operation. Magnetic brake

A
B
C
D
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A complete line of Automatic Polishing, Buffing and Grinding Equipment engineered to the job
MURRAY-WAY means the "better way" in automatic buffing, polishing and grinding. Here we show a representative group of MURRAY-WAY equipment now in use in plants throughout the country. Even your toughest surfacing problems may be solved automatically and economically through MURRAY-WAY equipment and engineering experience.
(A) Six Micro-Polish Units in Series
(B) Micro-Polish Unit
(C) #60 Polishing-Head
(D) 60 Series Belt Polishing-Head
(E) Horizontal-Platen Conveyor
(F) Continuous Dial-Table
(G) Six Station Dial-Table
(H) Vertical-Platen Conveyor
(I) #50 Universal Polishing Head
(J) Indexing Dial Table
(K) Straight Line Conveyor
MURRAY WAY
MURRAY-WAY CORP.
Maple Road E., Birmingham, Mich. P. O. Box 180,
AUTOMATIC POLISHING, BUFFING, GRINDING EQUIPMENT

Equipment and Supplies

and reversing switch are optional. For further information, use Reader Service Card.

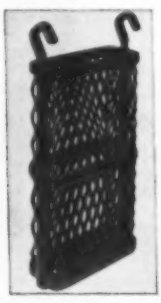
E—668. Emulsion Cleaner—The Magnus Chemical Company, Inc., Dept. P., Garwood, N. J., offers the Emulso Clean Process as an efficient method of removing contaminants from metal processing.

Although not merely a substitute for vapor degreasers, it is said to be used with complete satisfaction by metal finishers who have experienced difficulty in obtaining trichlorethylene or perchlorethylene.

The process is said to be especially effective for removing, from all metals, smut, lithopone, chalk, tripoli, chlorinated and sulphurized oils, and other stubborn contaminants, without hand scrubbing.

Magnusol, a nonflammable, nontoxic emulsion cleaner, is supplied in concentrated form to be mixed with safety solvent. The work to be cleaned is either dipped or sprayed. It is then removed, allowed to drain, and after a rinse with a water spray left physically clean. For further information, use Reader Service Card.

E—669. Scrap Anode Basket—An improved heavy-duty scrap-anode basket has been developed by the Belke Manufacturing Company, 947 N. Cicero Ave.



Chicago 51, Ill. It is constructed of heavy-gauge expanded steel welded to a frame of 3/16 x 1-inch steel members. Bands on sides and bottom and hooks are of one continuous 3/16 x 1-inch steel piece for maximum frame strength. Extra-heavy coating of Belke Universal Plastic is said to provide positive protection from sharp anode scrap and rough handling, and withstands all plating solutions.

All baskets are made to specified dimensions, and filter bags can be furnished for baskets of any size. For further information, use Reader Service Card.

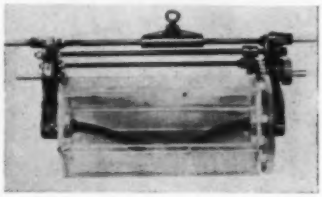
E—670. Fittings in Corrosion-Resistant Alloys—A new "Speedline" line of tube and pipe fittings (patents applied for) said to simplify installation and reduce pipe-line costs, has been announced by Horace T. Potts Company, Erie Ave. and D St., Philadelphia 34, Pa.

The insert flange (at top) consists of a corrosion-resistant serrated insert in a carbon-steel flange, made for standard tubing OD's and gauges and for nominal pipe sizes from ½ through 6 inch. The only tools required for working with this

flange are an expanding tool and a plain wrench. The new aligning connector for connecting standard heavy-wall Schedule 40S pipe (left) to light-wall Schedule 5S pipe is shown in the middle. This connector has in a number of cases permitted the use of low-cost, light-wall corrosion-resistant piping with its increased ID flow areas. Tubing OD and pipe sizes included are ½ through 4 inch. The new tube-and-pipe union (at bottom) combines the best features of the screwed-pipe union and the sanitary-tube union. It is claimed to remove the leakage problems encountered with corrosion-resistant ground joints. Parts contacting corrodents are made from more corrosion-resistant material such as stainless steel. The union is now produced in tube sizes and nominal pipe sizes from ½ through 4 inch. Specially designed auxiliary fittings, complete the range of Speedline fittings. Standard tubing and pipe-sized fittings are stocked. For further information, use Reader Service Card.

E—671. Plating Cylinder—The Hanson-Van Winkle-Munning Company, Matawan, N. J., announces the development of a new barrel cylinder made of Plexiglas.

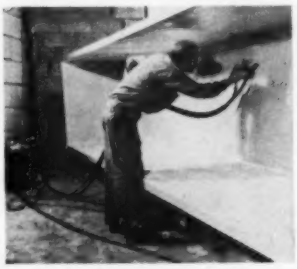
Suitable for either cyanide or acid solution, it can be carried through the entire cleaning, pickling and plating cycle. Where cyanide solution is involved, the cylinders will be equipped with 90-tooth cast-iron gears with both hangers of cast



iron. Where the cylinder is used in an acid solution, such as nickel, or carried through the entire cleaning and pickling cycle, 90-tooth Merlon or Plexiglas gears will be supplied, and the hanger arms will be of cast iron, rubber covered.

High-temperature Plexiglas, satisfactory for temperatures of 185° F is used. The cylinders are furnished with flexible dangler contacts. Hair-pin dangler contacts or disc contacts can also be supplied if desired. For further information, use Reader Service Card.

E—672. Tank, Rack Coatings Applied—Application of natural or synthetic protective coatings for metal or wood parts and products, for protection against corrosion or abrasion, is a service offered by American Rubberizing Company, 617 11th Ave. S., Minneapolis 4, Minn. All work is done in its Minneapolis plant. Coatings, either dipped or sprayed, may be applied to tanks and chutes, parts,



plating racks, screens, gloves, etc. The illustration shows the spraying of Neoprene on a steel tank for nickel plating. For further information, use Reader Service Card.

E—673. Aluminum Bright Dip.—Offering simple and direct processing, a new aluminum bright dip offered by Kaiser Aluminum & Chemical Sales, Inc.,

Is this the **INFORMATION** *you are looking for?*

SEYMOUR No. 950
Grade A Phosphor Bronze

95% Copper • 5% Tin

Outstanding characteristics of Seymour Phosphor Bronzes are their great toughness, ability to retain resiliency under countless flexures, resistance to wear, good electrical and thermal conductivity, good bearing qualities, high resistance to corrosion. Write for your copy of SEYMOUR PHOSPHOR BRONZE containing important data on sheet, wire and rod.

SHEET SIZES

Gauge	#36B&S (.0050) and heavier
Width	½" to and inc. 14"
Lengths	Commercial
Circles	2" to 14" in dia.
Coils or Rolls	Gauges .090 and thinner

SPECIFICATIONS

U.S. Navy	46-B-14
Federal	QQ-B-746
A.S.T.M.	B-103-42T
A.M.S.	4510
S.A.E.	77

USES

- Springs
- Diaphragms
- Fuse Clips
- Lock Washers
- Perforated Sheets
- Thermostatic Controls
- Microphone Assemblies
- Electrical Devices

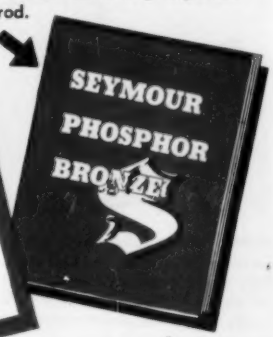
TEMPERS

	B. & S. Numbers Hard	Tensile Strength Lbs. Per Sq. In. Min.	Max.
	0	40,000	55,000
Soft	2	55,000	70,000
Half Hard	4	72,000	87,000
Hard	6	84,000	98,000
Extra Hard	8	91,000	105,000
Spring	10	96,000	109,000
Extra Spring			

Based on Tests of Sheet .040 Thick

PROPERTIES

	Spring Temper	Soft
Elongation % in 2"	1.5	50
Rockwell B ⅛" Ball 100 KG Load	95	30
Density—lbs. per cu. in.		.322
Elec. Cond % I.A.C.S. at 20° C.		16.5
Thermal Cond. BTU		47
Polishing		Excellent



THE SEYMOUR MANUFACTURING COMPANY, SEYMOUR, CONN.

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Equipment and Supplies

Palmolive Building, Chicago, Ill., is said to be far more economical than other methods, easy to control, and involves no occupational hazards. The bath is low in acid and requires only simple periodic additions.

One gallon is often sufficient to bright dip 90 sq ft. This bright dip is claimed to be effective on all aluminum alloys, especially those with high aluminum percentage. For further information, use Reader Service Card.

E—674. Finishing Barrel—An outstanding feature of the field-proven Almco Supersheen Finishing Barrel Model DBO-1 is the removable screening drawers which facilitate separating parts from

media, loading and unloading. The barrel is equipped with variable-speed drive for speeds of 25–60 rpm. The "twin" barrels measure 8 x 16 inches and are available with or without 1/4-inch Neoprene lining. All moving parts are en-

closed with the safety hood, and the construction is of heavy, welded steel. The unit is recommended for the processing of small lots of parts, close-tolerance work, and development work. For further information, use Reader Service Card.

E—675. Potassium Silver Cyanide—A water-soluble potassium silver cyanide, called Silver Sol-U-Salt, has been announced by Sel-Rex Precious Metals, Inc., 229 Main St., Belleville, N. J. The product, a pure, white, crystalline, free-flowing salt of known and definite chemical composition, is used to make up new silver cyanide plating solutions or for replenishment. It is added to the plating bath without filtering and does not affect its free cyanide content. It is packed in plastic bags, which can be removed from the outer container to eliminate waste or contamination. For further information, use Reader Service Card.

E—676. Bronze Lacquers—A new line of metallic bronze lacquer finishes, offering substantial improvement over earlier formulations of this type, has been announced by National Lacquer and Paint Company, Inc., 7415–39 S. Green St., Chicago 21, Ill. Fifteen shades are included in the standard line, with other colors supplied on special order. Standard colors include various shades of Old English, Antique, Statuary, Gold, Copper, Brass, etc. All are designed to simulate closely the appearance of plated metal.

The manufacturer claims the products to be noncaking, nonjelling, and relatively free from settling-out difficulties. All colors are warranted to be light-fast and nonfading. For further information, use Reader Service Card.

E—677. Water Displacing Compound—London Chemical Company, 607 S. Dearborn St., Chicago 5, Ill., offers a water-displacing cold-dip material called Hydrolift, which is said to eliminate the need for water dry-off operations with attendant water spotting, oxidizing and hydrating effects. It can be dipped, sprayed, or brushed on ferrous or nonferrous metal surfaces after water rinsing.

Instantly forming a film, even in the deepest crevices, it lifts any moisture to the surface, where it runs off. The film, when dry, is transparent and can neither be seen nor felt. Coverage is 8200 sq ft/gal. For further information, use Reader Service Card.

E—678. Surface Conditioner for Painting—The Turco 1620 Process, a development of Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif., is said to simplify acid spray or immersion washing and surface conditioning of ferrous and nonferrous metals prior to painting. Any existing spray-washing setup of three or more stages can ordinarily be used without modification of equipment or production lines.

Employing Turco 1620, an acid-type cleaner, the process performs three operations simultaneously: (1) removes soil and dirt without use of additives, often eliminating precleaning, (2) provides a firm paint bond, (3) inhibits rusting, usually eliminating the final chromic acid rinse. For further information, use Reader Service Card.

E—679. Copper-Nickel-Chromium Substitute—New protective coatings applied over "Iridite" and similar finishes are said to produce an attractive, durable finish similar to chromium and to add greatly to the life of scant composite chromium coatings now permitted.

Two types are avilable from the manufacturer, Strathmore Products, Inc., 1970 W. Fayette St., Syracuse 4, N. Y.; Baquik Clear Coating X2534, which is a baking type (from 225° F for 1 hour to 300° F for 15 min), and Metalbond Clear Coating SL-300, which is an air-drying type. Both can be sprayed or dipped, and both are waterwhite, contain a large percentage of solids, and will not discolor. Both have a high resistance to impact and abrasion and have withstood 200 hours of salt spray with no visible breakdown of the film. For further information, use Reader Service Card.

E—680. Carboy and Can Tilters—General Scientific Equipment Company, 2700

W. Huntingdon St., Philadelphia 32, Pa., offers a GS No. 11 Carboy Tilter and a GS No. 15 Easy-pour Tilter for safe and easy pouring of liquids. Both are of

welded and riveted construction. GS No. 11 is supplied with air vent. GS No. 15 is also used as a mixer. For further information, use Reader Service Card.

E—681. Steam Paint Spray System—A complete line of equipment for paint spraying includes a gun which makes use of superheated steam instead of compressed air. Recently developed by du Pont and supplied by American Brake Shoe Company, Kellogg Division, 97 Humboldt St., Rochester 9, N. Y., this system uses steam which atomizes and heats the paint or other finishing material, making it possible to use paints of higher viscosity. Heavier coats can be applied without sagging or running, and

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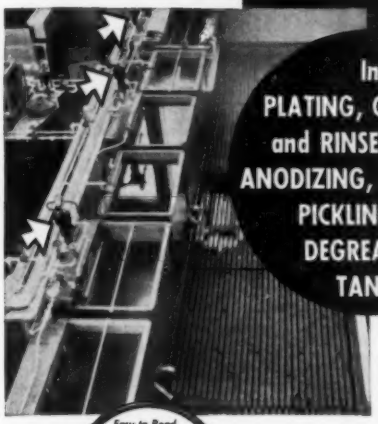

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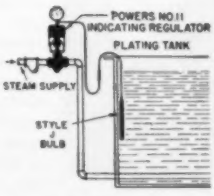

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pin-holing and popping, normally caused by entrapped air, are much reduced.

As much as 10–20 per cent in paint savings can be expected under most conditions through reduction of overspray and atomization losses. In addition, savings in solvents and thinners are realized through the use of finish materials with a higher concentration of solids. A steam source of 100 psi is necessary. For further information, use Reader Service Card.

E—682. Corrosion-Resistant Tubing—The Carpenter Steel Company, Alloy Tube Division, Union, N. J., announces the availability of tubing and pipe to handle a variety of oxidizing and reducing corrodents.

The new tubular products, called Carpenter Alloys B and C, are made from strip of the "Hastelloy" analyses. Alloy B has unusual resistance to hydrochloric acid in all concentrations and at all temperatures, including boiling. It is also recommended for sulfuric acid at temperatures above 80° C. It is not recommended for oxidizing atmospheres. Alloy C will withstand strong oxidizing conditions, such as nitric acid, chlorine, and acid solutions of ferric and cupric salts, as well as phosphoric, acetic, formic, and sulfuric acids. Alloy C tubing and pipe are generally recommended for use with hydrochloric acid up to 50° C. Full-finished round tubing of these alloys is available in sizes from 5/8 through 4½ inch. Round pipe, Schedules 5 and 10, comes in sizes 3/8 through 1 inch IPS. Tubing and pipe in both alloys can be readily fabricated with standard equipment for bending, etc. For further information, use Reader Service Card.

E—683. Rust-Inhibiting Primer—The Wilbur & Williams Company, Boston 35 (Brighton), Mass., announces a new member in their Totrust (death to rust) family. Totrust Instant-Dry Rust-Inhibitor Primer is said to be an exceptionally fast-drying, penetrating metal primer for assurance against peeling, chipping and rusting and enabling re-coating ordinarily in from ten to thirty minutes with all standard types of paint, as well as rubber-base paints, vinyl coatings and spraying lacquers. For further information, use Reader Service Card.

E—684. Safety Goggles—Willson Products, Inc., Reading, Pa., announces a new molded-rubber detachable padding mask for its heavy-duty cover-all safety cup goggles, which assures an extra tight fit for better protection in welding, chipping, heavy dust and acid operations. This mask may be purchased as an accessory or with the goggles. For further information, use Reader Service Card.

E—685. Fan Nozzles—A new and improved line of flat spray or fan nozzles has been announced by Bete Fog Nozzle, Inc., Greenfield, Mass. More uniform coverage with less waste of spray is claimed, because side jets or "horns" containing coarse droplets have been eliminated and the spray pattern made heavier in the center than at the edges of the fan. The Bete "F" Series nozzles include 13 discs made of long-wearing stainless steel with flow rates from 0.1 to 10 gpm and spray angles from 50° to 90°. All discs are interchangeable in a brass base-and-cap assembly having a ¼-inch male pipe connection. Built-in removable strainers are available for the smaller nozzles. For further information, use Reader Service Card.

E—686. Small Hard Chrome Plater—The Model A-20 Chromaster, working in combination with Chromasol, provides a completely portable hard-chromium plating system which can be used in tool rooms.

The plating unit, manufactured by Ward Leonard Electric Company, Mt. Vernon, N. Y., will handle metal surfaces up to 10 sq in at 2 asi. Integral with the tank is the small d-c power pack and complete controls, including a reversing switch for stripping. The solution is said to be noncritical, operates at room temperature, and is shipped in a liquid, concentrated form. For further information, use Reader Service Card.

E—687. Safety Signs—A wide selection of self-adhesive Quik-Label Safety Signs has been developed and introduced by the W. H. Brady Company, Dept. 387, Chippewa Falls, Wis. They are printed on extra-strength cotton cloth with self-adhesive backing. The message is shown in large bold letters on the proper safety background color. Each sign is coated with Silicone Plastic which protects it from dirt, grime, moisture, and weather, and it may be used either indoors or out-of-doors. It conforms to A. S. A. Standard Z35.1-1941 for Industrial Accident Prevention Signs. For further information, use Reader Service Card.

E—688. Silver-Clad Steel Strip as Substitute—A laminated strip product consisting of a solid sheet of silver on either one or both sides of a core of mild steel has been developed by the Rolled Plate Division of the American Silver Company, Inc., Flushing, N. Y., and is available in widths up to 4 inches, in thicknesses down to 0.005 inch, in any required temper, and in various silver-to-steel thickness ratios. The strip is produced wth a high-as-rolled lustre which is said to require practically no polishing, and can, if desired, be electroplated directly with gold or other nonrestricted metals. For further information, use Reader Service Card.

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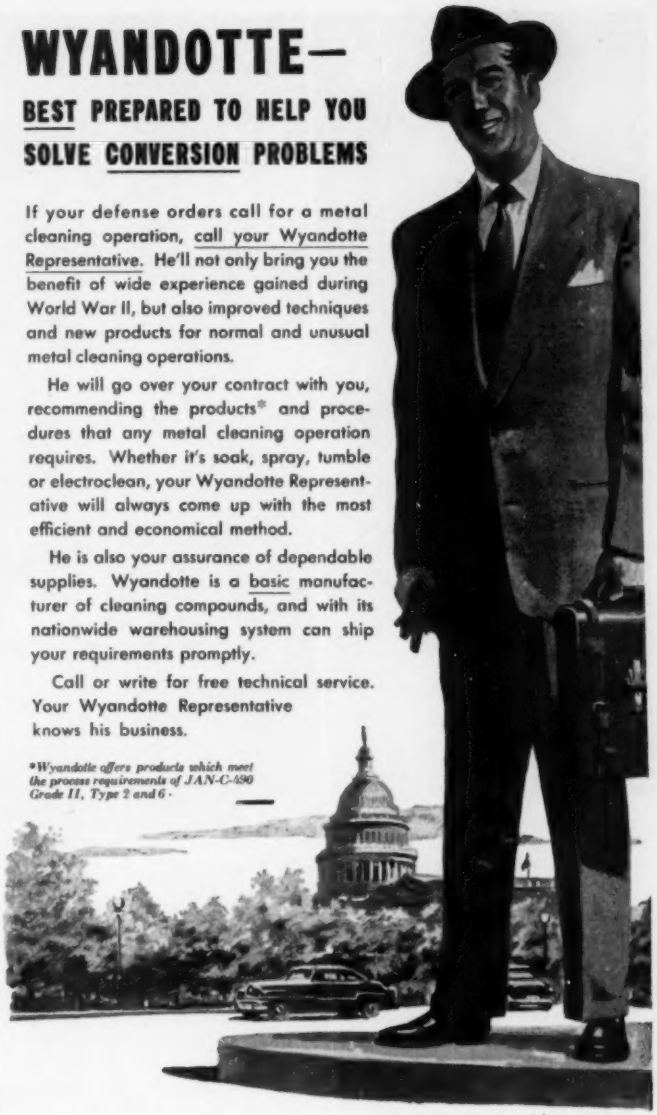
*Wyandotte offers products which meet the process requirements of JAN-C-490 Grade II, Type 2 and 6.



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plating

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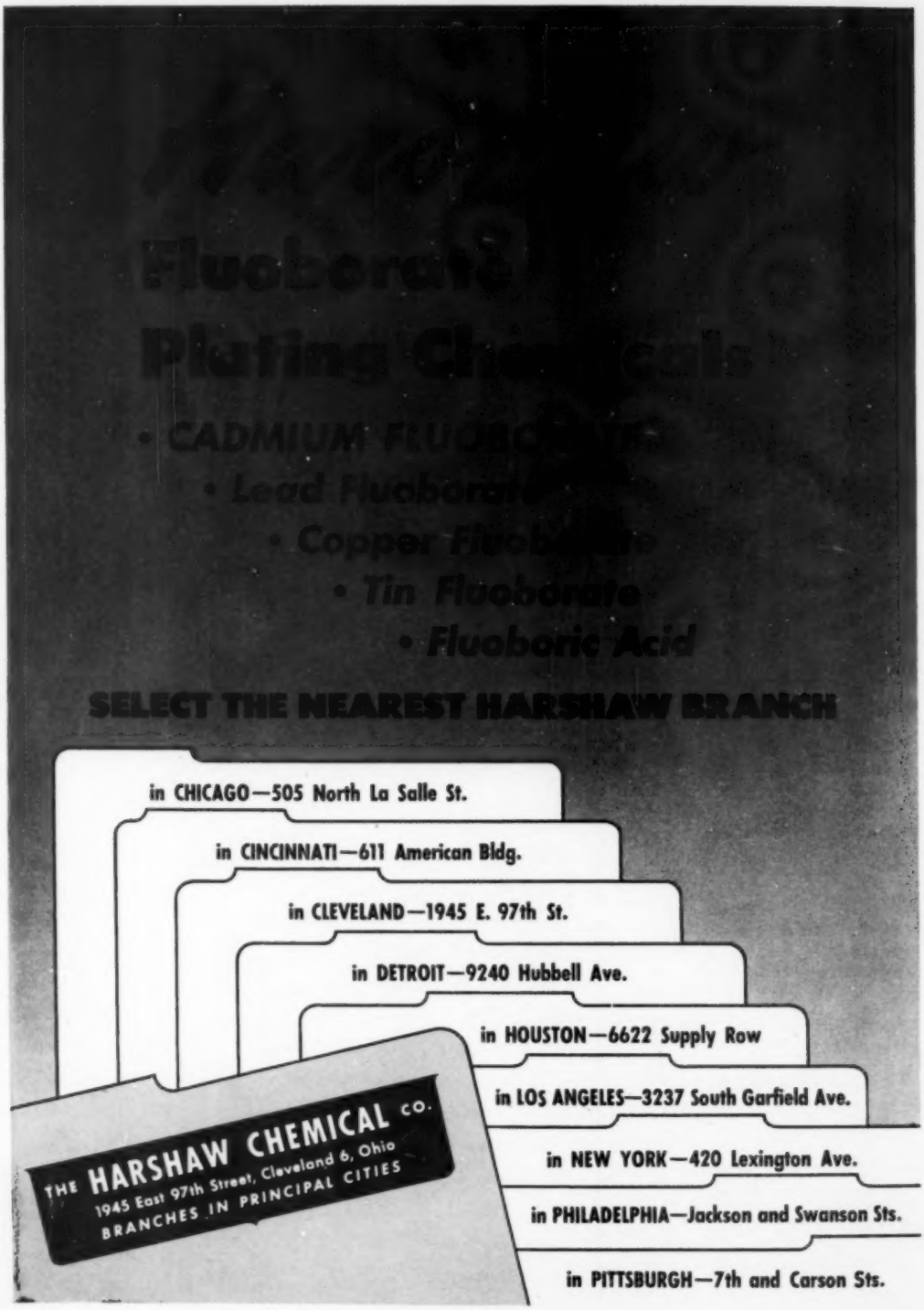
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BRANCHES IN PRINCIPAL CITIES

Editorial

Through Thick and Thin

THE REARMAMENT PROGRAM has had a curious effect on the plating industry in that it has forced platers to reduce plate thickness on many civilian goods and at the same time required them to deposit thick coatings on some defense items. The plating of coatings that are thicker than those to which one is accustomed is likely to be fraught with difficulty, and hence a short review of basic factors seems timely.

High deposit thickness, whether produced at high or low current density, magnifies faults in the deposit, which may not even be apparent at low thickness. The current density range is narrower because treeing and nodule formation appears at lower current density. Hence it may be necessary to employ better racking, including the use of shields and thiefs, and to arrange the anodes for more uniform current distribution. Allowable contamination limits for both soluble impurities and insoluble matter becomes lower. For example, a deposit that has only a slight tendency toward roughness or pitting at ordinary thicknesses is likely to be sandpapery or deeply pitted at the higher thickness. Adhesion must be more nearly perfect, because the higher total stress in the thicker deposit imposes a larger force at the interface, and it may be necessary to clean better and to take such precautions as applying the current to the work before it enters the bath.

Production requirements and economics usually make it desirable to deposit thicker coatings at higher current densities. Such plating introduces additional difficulties, which are independent of the thickness. On the cathode side, one needs heavier racks and more positive contacts, and if the work is of thin cross section, also a larger number of contacts. The plating range of the solution may have to be moved toward higher current densities by increases in metal content, temperature, and rate of agitation. On the anode side, one needs a large anode area and good anode contacts, and the concentration of anode-corroding constituent of the solution may have to be raised. The electrical conductivity of the solution may likewise have to be improved by the addition of conducting salts in order to hold down the tank voltage, and, of course, the current source must be capable of delivering the higher current at the higher voltage.

Where the thicker coating is to be put to engineering use, its physical properties are often important. This requires special care in the selection and maintenance of both plating solution and plating conditions. Because these properties change with the thickness of the deposit, they should be determined on specimens in the thickness range employed.

Whatever the circumstances, deposition of thick coatings requires the best in the way of continual control of both plating variables and plate. With such control and with a determination not to overlook the slightest sign of trouble but to correct it immediately, the plater should find his way unperturbed through thick and thin.

Gustaf Soderberg

A. E. S. Buffalo Convention, July 30 - Aug. 2, 1951

TENTATIVE PROGRAM FOR TECHNICAL SESSIONS

Opening Session, Keynote Address: "Electrodeposition Researches at the National Bureau of Standards" by Dr. William Blum, National Bureau of Standards

First Session, on "Engineering Aspects of Electroplating":

"Rinsing for Electroplating", by R. J. Rominski and F. L. Clifton, General Motors Research Laboratories

"Methods of Heating and Temperature Control of Plating Solutions", by W. E. Stadel and C. Civan, George L. Nankervis Company

"Plating of Bumpers", by Donald Schantz, Michigan Bumper Company

Additional papers on plating diaphragms and filtration are expected.

Second Session, on "Preparation and Plating of Zinc Base Die Castings":

"The Shortest Way", a movie, courtesy Doehler-Jarvis Corporation.

"Requirements of Die Castings for Plating", by G. J. Beckwith, Metallon Products, Inc.

"Mechanical Finishing of Die Castings Prior to Plating", by M. R. Caldwell, Doehler-Jarvis Corporation

"Chemical and Electrochemical Preparation of Die Castings for Plating", by Earl Arnold, L. H. Butcher Company

"Electroplating Zinc Base Die Castings", by C. G. Borlet, United Chromium, Inc.

Third Session, an "Open Forum on Substitute Finishes for Electroplating":

There will be 10-15-minute presentations of the subjects listed below, followed by a round-table discussion. The primary object of this session is to present information to the manufacturer of civilian goods on what use can be made of the substitute finishes as replacement for plating with restricted metals.

"Phosphate Coatings", by Alfred Douty, American Chemical Paint Company

"Chromate Treatments", by Charles W. Ostrander, Allied Research Products, Inc.

"Black Oxide Coatings", by Dr. Walter Meyer, Enthone, Inc.

"Clear and Pigmented Organic Coatings", by Donald R. Meserve, Organic Coatings Division, United Chromium, Inc.

"Rust Preventive Oils and Waxes", by A. W. Ackerman, F. E. Anderson Oil Company

Fourth Session, on "Some Practical Aspects of Plating Room Control":

"The Evaluation of Quality of Electrodeposits", by Carl Durbin, Chrysler Corporation

"Operating Control for Optimum Plating Conditions", by R. O. Hull and J. B. Winters, R. O. Hull Company, Inc.

"Some Practical Considerations of Current Distribution", by Dr. Ralph A. Schaefer and Harry Pochapsky, Cleveland Graphite Bronze Company

"Nickel Plating with Insoluble Anodes", by Dr. W. A. Wesley, D. S. Carr and E. J. Roehl, The International Nickel Company

Fifth Session, "Report on the A. E. S. Research Program":

"A New Degreasing Evaluation Test—The Atomizer Test", by Dr. Henry B. Linford, Columbia University

"How the Plating Industry Will Benefit from Research on Metal Cleaning", by E. T. Candee, Lea Manufacturing Company.

"Highlights of the A. E. S. Research Program", by Dr. Donald Price, Oakite Products, Inc.

THE HOST BRANCH

The Buffalo Branch is not yet 14 years old, but it has already been the host of one successful A. E. S. Convention, in 1943, and expects to repeat its performance this year.

The Branch may count its existence from October 23, 1937, because that was the date when a group of Buffalo platers met with A. E. S. Past President E. S. Thompson and Executive Secretary W. J. R. Kennedy to lay the foundation of the Branch. Four men led the movement. One was Joseph Ruff, who at this convention is in charge of the outing and co-chairmans the whole entertainment program; another, W. D. Hart, is the present Convention Registration Chairman. The remaining two were the late Warren Guy and Charles Logan. John Honnecker, now of Cleveland, Ohio, arranged for meeting room at the Stafford Arms Hotel.

When the Branch organized, Ruff becames its first president, a post which he held until 1944, and Hart its first secretary-treasurer. The early records testify to the tireless efforts of Hart and Honnecker in bringing new members into the Branch. By May, 1938, it had gained 24 members, and that figure had nearly doubled a year later, when the count was 44. The present membership is 85.

One reason for the Branch's success has undoubtedly been its attention to quality of technical programs. Here the leader has been Dr. C. J. Wernlund, who himself was one of the first speakers before the Branch, with the subject, "Modern Trends in Electroplating". He served as Branch Librarian for a number of years and has held other posts, including the presidency in 1948-1949. He is the Educational Chairman at the coming Convention.

Another reason for success has been the social activities of the Branch. From the very beginning the Branch has held a picnic during the summer months, which has helped to keep the group together.

It is difficult to single out a few for special mention among the many members who have contributed to the welfare of the Branch. Four additional names should not be passed by, however. One is that of F. S. Novakowski, who for a long time served as Treasurer, another that of H. A. Fudeman, who held the post of Secretary for several years. And Convention General Chairman Bert Kirchhoff and General Co-Chairman W. M. Fotheringham have for years been pillars of strength.

The present roster of officers and other functionaries of the Branch is as follows:

President—ANTHONY NIGRO
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Third Vice-President—LEON NOVAK
Secretary—B. F. FORTIN
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Sergeant-at-Arms—W. D. HART
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THE CONVENTION CITY

Much has happened in Buffalo since LaSalle built his ship, the Griffon, by the Niagara River in 1679. The first town, erected in 1810, became the headquarters of the Niagara frontier during the war with Britain, and was burnt in 1814. It was soon rebuilt, however, and saw the first steamboat on the Great Lakes, Walk-in-the-Water, built in 1818. Its importance increased with the completion of Erie Canal in 1825, and it was incorporated as a city in 1832, when its population was about 10,000.

According to the 1950 census, it is now the 14th in size of U. S. cities, with a population of Buffalo proper of 577,000 and of its metropolitan area of 1,086,000. As an inland port, however, it is first in value of commerce and 8th or 9th in tonnage.

Buffalo is also a great manufacturing center. Among its important products are flour, iron and steel, rubber, automobiles and accessories, airplanes, electrical equipment, chemicals, plastics, and meat products. Platers will recognize such names as American Optical Company, Bell Aircraft Company, Colonial Radio Corporation, Sylvania Products, Inc., and Trico Products Corporation, and there are many smaller firms doing plating.

(*Continued on page 506*)

In This Article

attention is called to the very large amount of chromic acid currently wasted by the plating industry. A package unit composed of glass-lined and stainless steel equipment for recovering this waste is described. The economics of the process are analyzed in detail, and an equation for the net annual profit is presented. Several examples show how to select the proper size unit and how to estimate the net annual profit or the amortization period.

RECOVERY OF CHROMIC ACID FROM PLATING RINSE WATERS

E. W. NEBEN AND W. F. SWANTON

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Introduction

The history of chemical engineering has been one of steady progress in applying the knowledge and experience gained in one industry to another. This has been rendered possible by the concept of unit operations, i. e., the breakdown of the series of complex steps unique to a given industry into the elemental or unit operations which in varying form and degree make up all process industries. Electroplating has long employed a number of such unit operations as fluid flow, heat transfer and filtration The magnitude of plating operations now carried on in many plants has made it profitable to draw on experience gained elsewhere in the unit operation of evaporation for the design of a system for the recovery of chromic acid from plating rinse waters.

This article will deal primarily with the recovery of this expensive substance. However, such valuable by-products as distilled water and heat recovery should be mentioned inasmuch as they can make a significant contribution towards the economics of the process. Kushner[1] has called attention to this fact. Another important feature is the public-relations and legal aspects of minimizing stream pollution. Small operators may find this process the most economical solution to the latter problem even if they are unable to justify its use on the basis of chromic acid recovery.

Recovery Potentialities

Of all the wastes which plating shops currently run down the sewer, few offer a more tempting opportunity for salvage than chromic acid in the rinse wa-

TABLE I. COST OF THREE EXPENSIVE PLATING SOLUTIONS

Solution	Constituents	Concentration oz/gal	Cost $/lb	Cost of Bath: Salts $/gal	Cost of Bath: Soluble Anodes $/gal
Chromium	Chromic acid	53	0.30	1.00	....
		33	0.30	0.62	....
Cadmium	Cadmium oxide	3.5	2.30	0.50	....
	Sodium cyanide	14.5	0.20	0.18	....
				0.68	
	Cadmium metal	3.1	2.80	....	0.54
Nickel	Nickel sulfate	32	0.25	0.50	....
	Nickel chloride	4	0.35	0.09	....
				0.59	
	Nickel metal	8	0.77	....	0.39

TABLE II. LOSS OF CHROMIC ACID BY DRAG-OUT
Plating solution: 53 oz/gal
Recovery-rinse solution: 10 oz/gal
Plate-out: 0.017 oz/gal, equivalent to 0.000015-inch deposit

Drainage Character of Work	Drag-out[2]	Plating Tank			Recovery Rinse Tank		
	d gal/sq ft	$53d$ oz/sq ft	R $53d/0.017$	loss* %	$10d$ oz/sq ft	R $10d/0.017$	loss* %
Vertical							
Well drained	0.0004	0.021	1.24	55	0.004	0.24	19
Poorly drained	0.002	0.106	6.2	86	0.020	1.18	54
Very poorly drained	0.004	0.21	12.4	93	0.040	2.35	70
Horizontal							
Well drained	0.0008	0.042	2.5	71	0.008	0.47	32
Very poorly drained	0.010	0.53	31.0	97	0.10	5.9	86
Cup shape							
Well drained	0.008	0.42	25.0	96	0.08	4.7	82
Very poorly drained	0.024	1.27	75.0	99	0.24	14.0	93

*Loss in per cent = $100\,(53d)/(53d + 0.017)$

ters from chromium plating operations. The reasons are: (1) the high cost of the solution employed, (2) the high ratio of drag-out to useful consumption, or plate-out, (3) the simplicity of composition of the bath, and (4) its reasonably high tolerance to impurities.

That the chromium plating bath is one of the most costly of the common plating solutions may be seen from Table I in which the cost of the primary constituents of the chromium plating solution is compared with those of two other expensive baths. In this table two bases for comparison have been used. One is the cost of the bath as made up from salts; the other is the cost of the metal in solution as obtained from soluble anodes.

The extreme thinness of ornamental chromium plate (0.00001–0.00002 inch; 0.25–0.50μ) combined with the high concentration of the solution means a very high ratio, R, of chromic acid consumed by drag-out, d, to that consumed by plate-out, as shown in Table II. In this connection it should be pointed out that automatic operation seldom permits full advantage to be taken of a drag-out recovery rinse inasmuch as the volume of the latter is necessarily much larger than in a hand-operated line and evaporation losses from the plating tank are much smaller.

High drag-outs of chromic acid are also indicated in data presented by Dodge and Reams[3] which are summarized in Table III. These data, with one exception, show that hexavalent chromium exceeds other metallic impurities in plating waste waters by a wide margin.

The chromium plating solution, consisting as it does of only two nonvolatile and stable substances dissolved in water, will not suffer loss or decomposition when subjected to vacuum evaporation. Furthermore,

TABLE III. COMPOSITION OF PLATING WASTE WATERS[3]

Waste Type	Plant	Concentration of				
		Cr^{+6} ppm	Cu ppm	Ni ppm	Zn ppm	Fe ppm
General Plating	II*	2.0	0.5	0.3	...	...
	M	3.5	7.1	0.1	6.8	2.3
	Y	16.6	2.0	0.14	2.1	3.1
	E	76	32	2	0	2.3
Pickling	VII	6,080–22,080	1,070–3,710	152–438	...	...
Segregated Chromium	IV	242	3.6	1.1	...	trace
	VI†	473	...	...	...	...

*Waste volume, 400,000 gal/day

†Waste volume, 300,000 gal/day

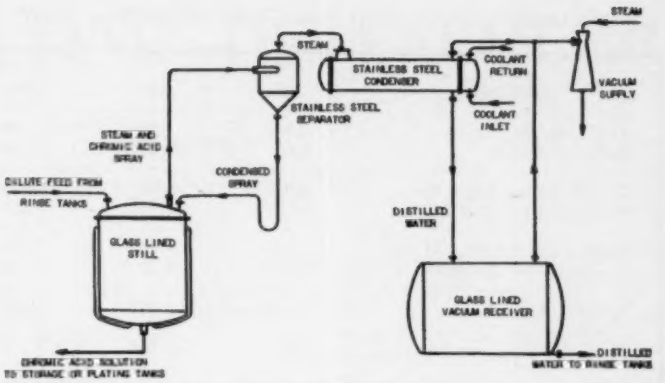

Fig. 1. Pfaudler chromic acid recovery process

its relative lack of sensitivity to the common impurities means that concentration is not likely to introduce troubles from this source, expecially when distilled or deionized water is used for make-up and rinses.

Vacuum Evaporation Recovery Process

Probably the greatest deterrent in the past to the idea of reclaiming chromic acid rinse waters stemmed from the lack of suitable equipment. Recently, however, a package unit consisting of glass-lined and stainless-steel equipment has been presented to the industry. This unit, illustrated as a flow diagram in Fig. 1. has a life well in excess of any reasonable amortization period for the sulfate bath, and indications are that a safe margin exists even for baths employing a fluoride catalyst. The high resistance of glass to concentrated chromic acid solution in comparison with other materials of construction is shown in Table IV.

The operation of the process can begin at any convenient time after the concentration of chromic acid in the first rinse tank, which is nonflowing, has risen to a suitable level. This level will vary from plant to plant, but the economic analysis presented below may be used as a guide. The process is started by drawing the rinse solution into the kettle with suction from the steam ejector or vacuum pump provided in the unit. After completion of this step, the empty rinse tank is refilled immediately with distilled water remaining in the vacuum receiver tank from the previous batch, or tap water in the case of the first batch, in order that plating production may be resumed immediately. Evaporation then proceeds without further attention until the volume of distillate in the receiver tank indicates that the desired final concentration in the glass-lined kettle has been reached. The concentrated solution may be stored in the kettle and withdrawn as required to make up evaporation losses in the plating tank, or it may be withdrawn immediately to a separate storage tank. After it has been entirely withdrawn, the unit is ready for the next batch.

Selection of Standard Size Unit

In this process, the glass-lined kettle, the first rinse tank, and the vacuum receiver tank are ordinarily of equal capacity. The proper capacity is determined by the rate of chromic acid drag-out and other criteria pertaining to the individual plant. A suggested rule is to select as the proper size that standard volume, 200, 300, 500, 1000, or 2000 gal (760, 1100, 1900, 3800, or 7600 l), which in the first rinse tank will build up to approximately 5 oz/gal (37.5 g/l) during the course of one or two shifts of plating operations. Suppose, for example, that the concentration of chromic acid build up in a 750-gal rinse tank to 3 oz/gal (22.5 g/l) in 4 hours. Then for an 8-hour shift the build up in 500- and 1000-gal (1900- and 3800-l) tanks would be approximately:

500 gal (1900 l): 3 (750/500) (8/4) = 9 oz/gal (67.5 g/l)

1000 gal (3800 l): 3 (750/1000) (8/4) = 4.5 oz/gal (34 g/l)

Hence, a 1000-gal (3800-l) size should be selected. However, if it is desired to reconcentrate only once every 16 hours, then a 2000-gal (7600-l) size should be selected. If two equal plating lines are used, then the size of the glass-lined kettle should be doubled. The condenser and the receiver tank are sized according to the glass-lined kettle in the balanced unit.

Economic Analysis

The foregoing discussion has brought out that a very high percentage of chromic acid used in ornamental chromium plating baths is wasted under cur-

TABLE IV. RESISTANCE OF CONSTRUCTION MATERIALS TO CONCENTRATED CHROMIC ACID SOLUTION

Material	Penetration per year inch
Monel	1.69
Nickel	0.138
Carbon steel	0.67
Glass	0.00022

TABLE V. INSTALLED COST AND OPERATING COSTS FOR STANDARD UNITS

Batch Size, gal	200	300	500	1000	2000
FOB cost, $	8,000	9,000	11,000	14,000	18,000
Installed cost, $	9,600	10,800	13,200	16,800	21,600
75 psig steam/batch, lb	2,000	3,000	5,000	10,000	20,000
Steam cost/batch, $	1.30	1.95	3.25	6.50	13.00
Cooling water/batch, M gal	10	16	23	48	100
Cooling water cost/batch, $	0.50	0.80	1.15	2.40	5.00
Labor cost/batch, $	1.50	1.50	1.50	1.50	1.50
Total operating cost/batch, $	3.30	4.25	5.90	11.40	19.50

rent operating practices, and a vacuum evaporation process for recovering essentially all of this valuable material has been described. The question now arises: under what circumstances will the process be profitable? The remainder of this article deals with the answer to this question.

In the economic analysis which follows it is assumed recovered chromic acid at 30¢/lb is the sole source of income. Seventy-five pound steam for the kettle jacket and for the ejector has been charged at the rate of 65¢/M lb, and one man-hour per batch at $1.50 has been taken as the labor cost. The cost of cooling water has been estimated at 5¢/M gal which may be conservative in view of the fact that this water may be readily used again for rinse purposes. Fixed charges have been assumed to be 10 per cent of the installed cost, and the latter, because of the completeness of the unit and the relatively simple service connections required by it, has been taken as 120 per cent of the fob cost for the packaged unit.

These assumptions are embodied in the following expression:

$$\textit{Net Annual Profit} = (0.3\,VC/16 - oc)\,n - (cf + 0.1)ic \qquad (1)$$

where V = size of batch, gal (see Table V)
C = chromic acid concentration in rinse water, oz/gal
0.3 = value of chromic acid, $/lb
16 = oz/lb

TABLE VI. ANNUAL AMORTIZATION COST FACTOR
Interest rate: 6 per cent per annum

Amortization Period yr	Cost Factor
1	1.06
2	0.545
3	0.374
4	0.289
5	0.237

oc = operating cost per batch, $ (see Table V)
n = number of batches per year
cf = annual amortization cost factor (see Table VI)
0.1 = fixed charges factor
ic = installed cost, $ (see Table V)

Equation (1) and the data presented in Tables V and VI may now be used to answer many questions with respect to the economy of this process. The following examples will illustrate the solution of typical problems:

I. What concentration of chromic acid must be present in a 1000-gal batch of rinse water to offset exactly the operating cost?
$0.3VC/16 = oc$
$C = 16\ (oc)/0.3V = 16\ (11.40)/300 = 0.61$ oz/gal (Answer)

II. What annual profit will be realized for the example given in the paragraph on the selection of a standard-size unit if the cost is to be amortized over 3 years using 300 one-thousand-gallon batches per year?
Substitute in equation (1) as follows:
Net Annual Profit $= (0.3 \times 1000 \times 4.5/16 - 11.40)\ 300 - (0.374 + 0.1) \times 16{,}800 =$ $13,940 (Answer)

III. How many years would be required to amortize a 500-gal unit if only 150 batches of 4 oz/gal chromic acid are recovered per year? This problem must be solved by trial and error.
First assume 3 years:
Net Annual Profit $= (0.3 \times 500 \times 4/16 - 5.90)\ 150 - (0.374 + 0.1) \times 13{,}200 = -1{,}650$
The minus sign indicates a loss.
Assume 4 years: Again a loss, this time of $530.00
Assume 5 years: This time a profit of $150 per year. Hence five years are required to realize a profit on this installation under these conditions (Answer)

IV. What would be the cost of distilled water if a 1000-gal unit were operated for this purpose between rinse-water batches so that only operat-

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HOT SPRAYING OF LACQUER

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Introduction

Hot spraying of lacquer is no longer in the experimental stage but an accomplished reality, and it is within the reach of all those who wish to adopt it. In many plants hot spraying has brought about important benefits, in some cases cutting finishing costs as much as in half.

For a number of years before the War, hot spraying of lacquers was regarded with great interest, was talked about by many and tried by a few, but because most of these tests were conducted under incorrect conditions, they were unsuccessful. As a result, the idea met with disfavor and was regarded as impractical. However, it was realized by some leaders in the industry that the theory behind the process was sound, and that it would bring many benefits if it could be realized. They held that what remained was to work out properly the mechanics of hot spraying.

Recently hot spraying has been revived under corrected conditions, and it has now been adopted in so many plants that there is no longer any doubt as to its feasibility and success.

Principles

Every organic finish—lacquer, synthetic, or whatever it may be—is affected by temperature variations. Each has one ideal temperature at which it is best applied, and once this temperature has been ascertained, the hot-spray process makes it possible to spray constantly at this one ideal temperature. The variations caused by fluctuating temperatures are eliminated once and for all.

The following phenomena take place when hot spraying is carried out properly: (1) The viscosity of the lacquer is greatly reduced by heat (Fig. 1), eliminating the need for some of the thinner; (2) a uniform condition of lacquer temperature and viscosity is established, eliminating the fluctuations that are now normally experienced; (3) in the process of atomization, a larger amount of the solvent is dissipated, so that lacquer of higher solids content is deposited on the work.

Benefits

As a result, it is possible to obtain a whole series of benefits from the hot-spray process:

Savings:

1. Less labor
2. Less thinner
3. Less overspray
4. Less rejects
5. Less sanding and polishing
6. Less air per pound of solids

Increased production

1. Uniform temperature constantly maintained
2. Shorter spraying time
3. Less number of coats
4. Absence of blushing

Improved quality

1. Greater depth and fullness of finish
2. Less orange peel
3. Better covered surface imperfections
4. Greater cold-check resistance possible

Reduced health hazards

1. Less spray fog to rebound into sprayer's face
2. Less solvent fumes to inhale

Reduced fire hazards

1. Lacquers and thinners can be stored outside of building
2. Less solvent fumes to exhaust from drying room

Waste reduction

The major benefit is the elimination of a large portion of the waste encountered with the normal method of spraying. Spray painting is very inefficient when the tremendous waste inherent in the operation is considered. Because it is the fastest and cleanest method of painting, the common tendency is to accept or ignore phlegmatically the waste involved. Hot spraying partially reduces this waste, because it lowers viscosity with heat, in effect substituting heat for thinner. As a consequence, more solids are deposited with less solvents, with less spraying time, and with less loss due to overspray. This is true for all types of finishes; but lacquers will be dealt with specifically.

For an average cold lacquer, the addition of four pounds of solvents is required to reduce one pound of solids to sufficiently low viscosity that the spray gun can atomize it properly. In other words, in a 5-gal mixture, 4-gal are solvents and the rest solids. Of course, the solvents are simply a conveying agent which evaporates and becomes a complete loss. Furthermore, in spraying it is not uncommon to lose 50 per cent of the sprayed mixture in overspray. Therefore, one has to mix and spray 5 lb of material to deposit 0.5 lb of solids on the product surface. Four and one-half lb are completely wasted, plus the labor required to spray them.

With hot spraying, the loss can be reduced approximately by half. Lacquer is generally heated to a fairly high temperature (160° F) at which its viscosity is

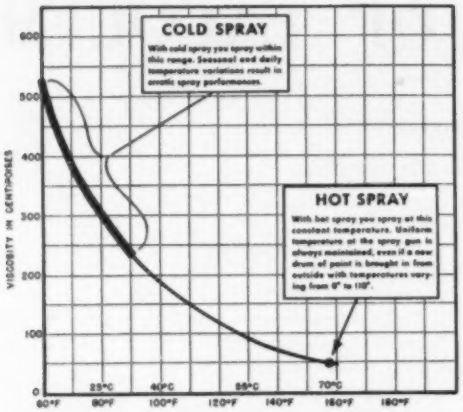

Fig. 1. Effect of temperature on viscosity of a low-viscosity nitrocellulose lacquer. Courtesy Hercules Powder Company

reduced to approximately one-fourth of what it was in the cold state. It then requires only from 2 to 2.5 lb of solvents to carry 1 lb of solids. A 3-gal mixture has the same solid content and covers the same surface area as a 5-gal cold-spray mixture. Because the heated lacquer is easier to atomize, the spray gun can handle a somewhat larger volume of lacquer per second of trigger action. For these reasons, there is a distinct possibility of conspicuous savings in the amount of labor required to spray a given number of pieces with a given film thickness. In practice, the output in the spray booth is doubled in a majority of cases.

Film thickness

Aside from the fact that heating of lacquer lowers its viscosity, there is another important physical phenomenon to consider, namely, the greatly increased ratio of solvent lost in the process of atomization. In cold spraying, approximately 20 per cent of the solvents in the lacquer is driven off in atomization. The amount varies with the distance of the gun from the surface, the air pressure, the humidity of the air, etc., but in any event the lacquer deposited on the product surface has a higher solids-to-solvent ratio than when it left the gun. When the lacquer is heated to 160° F, the solvents are near their boiling point, and therefore a much larger percentage of the solvents are lost in atomization—as much as 60 per cent or more. This is very desirable, as long as the remaining solvents carry the burden of providing sufficient flow and leveling action. The result is a much greater film thickness on a surface before the sag point is reached. By hot spraying, the finisher can duplicate the build and spray performance of other finishes quite readily. One handling, one trip through the spray booth, will in many cases accomplish that which normally requires two separate spray operations.

These beneficial results are now being achieved in many plants all over the country. A typical example is a report by a large dental equipment manufacturer, who states, "Since installation of the paint heater, we have doubled our production on the spray line. With the cold spray process we applied six coats of lacquer. With the hot spray process we apply two coats and get better coverage. We also use 50 per cent less thinner, and on top of this we have reduced re-work to a minimum".

Additional benefits

Among other benefits is the *reduction of overspray* which results from the use of heat for viscosity reduction and spraying with the lowest possible atomizing air pressure. On many occasions, atomizing air pressure has been reduced to one-half or one-third of that used in cold spraying, resulting in a minimum of paint loss due to atomized particles being blown past the object being sprayed.

It is also possible to obtain a finish with *greater depth and better flow-out*, which requires less sanding and polishing. Imperfections in the metal can be covered better because the hot-sprayed lacquer film has less shrinkage. That annoying seasonal problem, *blushing*, is eliminated without special retarders.

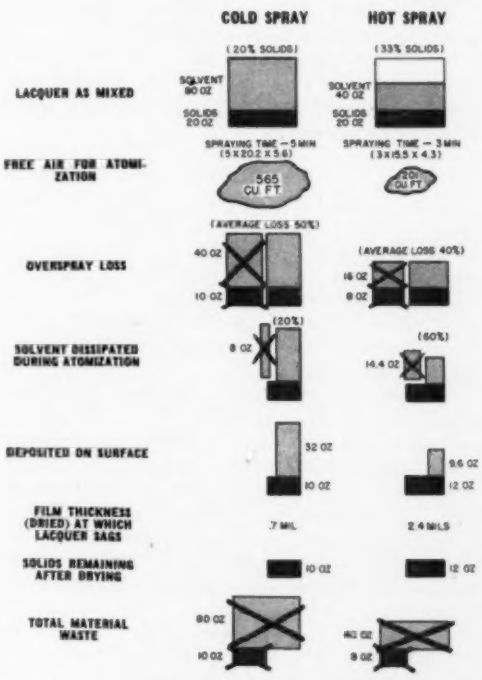

Fig. 2. Graphic summary of lacquer losses on typical spraying with ordinary cold-spray lacquer and hot-spray lacquer. With the latter, 50 per cent less solvents, 20 per cent less lacquer (due to overspray), and 40 per cent less labor are required

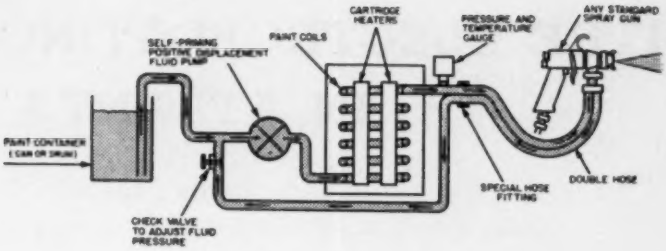

Fig. 3. Diagram of circulating paint heater

Development Work

To accomplish successful hot spraying of lacquer a number of major difficulties have had to be overcome in the development of (1) a safe and thoroughly practical lacquer-heating unit, and (2) better hot-lacquer formulas. Most difficult of all was to overcome the skepticism created by previous failures.

Equipment

It was necessary to develop a practical and safe lacquer heater proper, one that was not too complicated for the sprayers to operate. There are now a number of efficient lacquer heaters on the market.

It was also necessary to develop a trouble-free mechanism to circulate the lacquer through the heater to the spray gun and back. The noncirculating heater is not adaptable for lacquer use except in isolated cases. Pumping hot lacquer presents a number of problems. For example, to keep the shaft seal properly lubricated was difficult because of the heat generated and the hot solvents coming in contact with the seal. A circulating system also had to be devised which would enable the pump to operate slowly, because the hot lacquer does not have the lubricating ability of cold lacquer, and hence the pigments in hot lacquers have a much greater abrasive action. Another critical problem to be solved was finding a fluid hose which would stand the hot solvents. The ordinary Thiokol-lined hose commonly used was found inadequate because it would swell and cause an interior restriction. Hence, it not only had a short life, but it gave an erratic performance because of unreliable material flow. This has now been overcome, and there are fluid hoses on the market which will perform efficiently when used with hot lacquers.

Hot-lacquer formulations

Coincidental with the development of heaters, great progress has been made in the development of better hot-lacquer formulas. An extremely valuable contribution has been made by one of the large companies manufacturing nitrocellulose. It sent one of its executives through Europe to study the progress made there, for it seemed the Europeans have been far ahead of us in this development. Then, using lacquer heaters made in this country plus the best one available in Europe, this company devoted a whole year to thorough analysis of hot-spray formulations and

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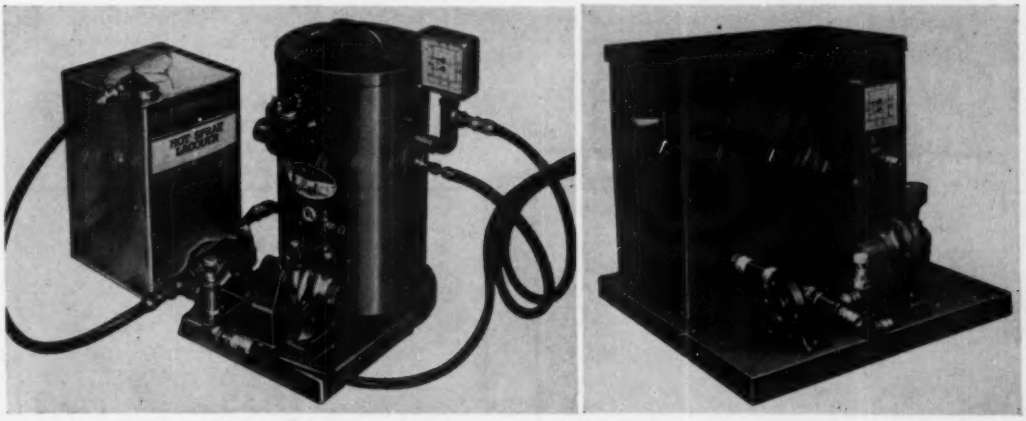

Fig. 4. Two Bede circulating, explosion-proof paint heaters, with continuous circulation to reduce temperature drop between heater and spray gun and with adjustable paint pressure and temperature. Unit at right is designed for installations with two or more guns

THE ELECTROPLATING INDUSTRY IN ATLANTA II

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The previous installment (March, 1951) showed a year-by-year trend in the total number of plants engaged in electroplating. Furthermore, it was noted that while the number of job shops increased by only two from 1940 to 1949, the number of plants having departments to produce electroplating for their own consumption increased by eight. A number of leading producers of the city estimated that the volume of finishing in their plants has more than doubled since 1940. If a similar increase has occurred in all plants, both job shops and those producing finishing for themselves, which have also substantially doubled in number—i. e., from eleven to twenty—it seems reasonable to infer that the aggregate volume of finishing in Atlanta increased to approximately four times what it was in 1940. That this may be conservative is indicated by the figures in Table IV, which show that the value of plating produced locally for the Atlanta market increased from about $9,000 in 1940 to nearly $60,000 in 1948, or more than six times.

It appears, however, that the bulk of the increase has not gone to the job shops in Atlanta. This is substantiated by Table V, which shows the value of plating purchased by Atlanta industrial consumers from plants outside the Atlanta area. A comparison of Tables IV and V with Table VI, which shows the total volume of plating purchased by Atlanta industrial consumers from both Atlanta shops and shops elsewhere, indicates an increasing loss of possible business to outside competitors. On 1948, about $140,000 of business went to shops in other cities, and the estimated figure for 1950 is approximately $460,000.

Earlier, general remarks were made regarding the consumer appraisal of the high costs and often low quality of the electroplating in Atlanta. In view of the potential market in Atlanta, several specific comments follow regarding various types of finishes.

Anodizing

One consumer, a producer of food machinery, reported that the local price of anodizing is too high, and that whenever it is possible he avoids the use of anodizing by changes in his product.

Another consumer, a producer of aluminum products, also reported anodizing costs of Atlanta firms too high and may put in his own finishing department.

Still another consumer of anodized finishes, a sign company, reported that he purchases his requirements in Illinois and Ohio, *not knowing* that such finishes are available in Atlanta—an indication that the Atlanta job plating shops do not solicit business vigorously.

Cadmium

The same food machinery producer avoids use of this finish by changes in design, because the cost is too high.

One producer of textile accessories who does not use plating contemplates a change in design, which will require cadmium plating. This potential consumer reported that he has never been solicited for business by Atlanta shops.

(*Continued on page 469*)

TABLE IV. VOLUME OF PLATING PURCHASED BY ATLANTA INDUSTRIAL CONSUMERS FROM ATLANTA JOB SHOPS

Type of Finishing	Year			
	1940	1945	1948	1950*
Anodizing	.....	.....	$ 4,400	$ 5,550
Cadmium	$ 775	$ 3,090	12,875	20,360
Chromium	6,700	6,440	17,025	30,280
Copper	200	2,300	4,200	6,200
Nickel	1,470	9,945	19,765	27,380
Total Volume	$ 9,145	$21,775	$ 58,265	$ 89,770
Number of Consumers Reporting	24	30	33	50
Average	$ 381	$ 726	$ 1,099	$ 1,795

*Data estimated by reporting consumers.

TABLE V. VOLUME OF PLATING PURCHASED BY ATLANTA INDUSTRIAL CONSUMERS FROM PLANTS OUTSIDE THE ATLANTA AREA

Type of Finishing	Year			
	1940	1945	1948	1950*
Anodizing	$ 5,000	$ 1,000	$ 4,500	$ 14,000
Chromium	1,400	27,400	139,700	448,500
Silver	200	800	500	500
Total Volume	$ 6,600	$29,200	$144,700	$463,000
Number of Consumers Reporting	3	5	9	8
Average	$ 2,200	$ 5,840	$ 16,078	$ 57,880

*Data estimated by reporting consumers.

Making Electrotypes

Electrotyping is the process of producing duplicates from letter-press material--engravings, type forms, wood cuts, etc.--by electrodepositing copper or nickel or both on molds taken from the originals . . . A review of the basic principles and the type of plating solutions used is found in the paper by Peters, "Advances in Electrodeposition in the Graphic Arts", published in the 1950 A.E.S. Proceedings . . .

In this story, we shall show many of the individual steps that are taken in the production of curved electrotypes for rotary-press printing. These plates are used for large-scale printing and are capable of producing as many as 1,000,000 impressions. Type, on the contrary, cannot withstand many more than 75,000 impressions without producing inferior press work . . . The story is told by Edward J. Lynch, Superintendent of The Condé Nast Press, a division of The Condé Nast Publications, Inc., publisher of Vogue, House and Garden, Glamour, and other well-known magazines. The Press is situated in Greenwich, Connecticut and employs over 900 persons. Besides the Nast magazines, it prints other national magazines, and all told it produces more than 50,000,000 copies plus considerable high-grade advertising printing. . . One whose contact with printing dates back several years will be astounded at the cleanliness of the Electrotyping Department. The wax-molding process with its graphite dust has been superceded by molding in plastic. The Vinylite mold may be used to make a number of electrotypes, and the Vinylite may be molded dozens of times.

The molding begins by thorough solvent spraying (1) of the form of original letterpress material. There is a cleaning operation between every step to eliminate all extraneous matter, the bane of electrotypers.

The mold material, a Vinylite sheet, is being placed over the form (2), which has been warmed on a heating unit. A mold-heating unit is lowered to rest on the form for about a minute, and after it has been removed, a resilient cork blanket and newspaper are placed over the plastic. The form is moved into the molding press, subjected to an average pressure of 50 tons, and water cooled under a cooling unit.

The mold has been removed from the form and is being inspected by the operator (3).

The face of the mold has been cleaned thoroughly, sensitized by spraying with a stannous chloride solution, and rinsed. It is now being sprayed with a silver solution (4) to make it electrically conductive. After a cold-water rinse, the mold is fastened to a glass case with elastics and sent to the battery, or plating, room.

The mold has been placed on a hook and is being lowered into the nickel plating tank (5) for deposition of 0.001–0.002 inch of nickel in 30–60 minutes. Following rinsing, it is transferred to a copper plating tank for deposition of approximately 0.010-inch copper in about 90 minutes. The mold is immersed in warm water, and the plastic pulled from the shell, the edges of which are then trimmed with a chopper knife.

The shell is now strengthened for printing by means of a backing. It is laid face down, brushed with a soldering flux, and covered with a tin foil. A thick paste of patching plaster and water is brushed over the face of the shell to prevent adhe-

sion of metal. The shell is placed face down on one of the heated pans of the casting machine until the tin foil has melted (6). Then molten lead alloy is poured through the spout onto the back of the shell to a thickness of about $\frac{3}{8}$ inch.

After the casting pan has been air cooled and the cast block has been removed, it is turned over and scrubbed on the cleaning machine (7).

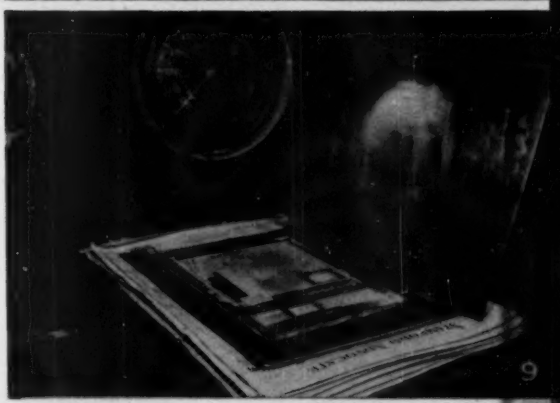
A circular saw is used to cut apart the pages (8) and to trim them.

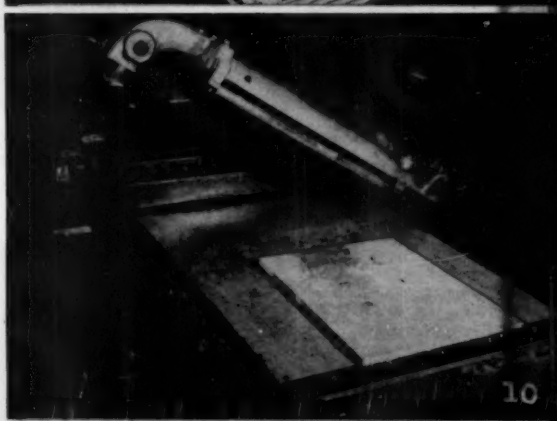
The electro is placed on a special grid (9), its face is covered with an aluminum sheet, and pressure is applied in a hydraulic press to eliminate some of the distortion caused by contraction and expansion of the shell.

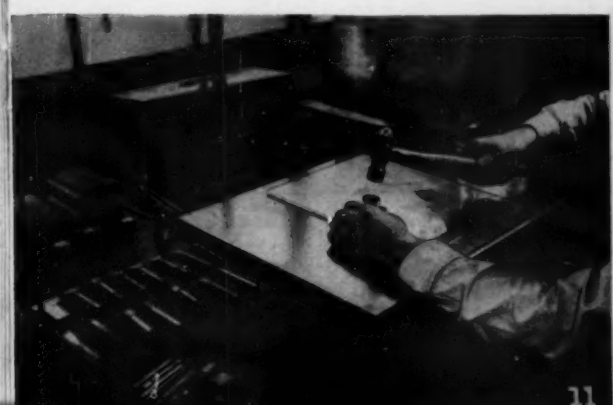
Excess metal is shaved off the back of the electro (10). It is then returned to the hydraulic press for another "squeeze".

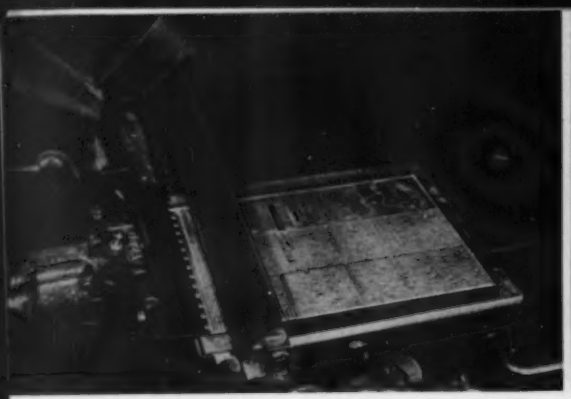
An expert electrotyper has blackened the face of the electro with a small gas flame and rubbed it with a special electrotyper's rubber. Wherever it remained black, the area is low, and the back has been marked correspondingly with calipers. The electro has now been placed upside down, and the finisher is hammering up the low spots (11), using punches of various sizes. High spots are hammered down from the front. The back is then given a second shave to within 0.010 inch of the final.

To "pull the pre-make-ready" in the printing plate, male and female mats are cut by pressmen and placed in identical position on face and back (12). The plate is then passed between two steel rollers, and, the pressure exerted causes the highlights to be depressed 0.002 inch and the shadows to be raised the same amount.









Following a final shave to a thickness determined by the type of press to be used, the plate is squared top and bottom on a squaring machine (left). The plate is curved (right) to fit the press roll and the layout of the printing form by passing it between a set of three adjustable steel rolls placed in triangle formation the required distance apart.

The curved electro is fastened to a cylinder of the beveling machine, which bevels each edge (left) to enable it to be locked on the press cylinder by "catches". "Dead metal" in nonprinting areas is routed off in a routing machine (right) to a depth of about 0.040 inch below the printing surface.

The electro is mounted on the cylinder of a rotary proof press (left) and several proofs are pulled on the kind of paper to be printed and on coated (glossy) paper for examination and record. An imperfect plate and proof on which the imperfections are marked are turned over to a finisher, who trims edges, repairs broken letters, joins rules, etc. (right). A final proof is then pulled and compared with the marked proof. If it is approved, the electro is ready for the pressroom.

Electroplating in Atlanta

(*Continued from page 464*)

Another producer of textile equipment said that he is discontinuing the use of cadmium plating because cheaper substitute materials are now available.

Chromium

The producer of food machinery, who reported avoiding use of anodizing and cadmium plating, also avoids the use of chromium plating by changes in design, since the cost of chromium plating is high.

One potential consumer said he is interested in hard chromium plating, but that this type of finish is not produced satisfactorily by Atlanta shops.

Another consumer reported that he can send his parts to Illinois and have them finished with a better quality of finish and at a lower price than is available in the Atlanta area.

A producer of peanut cookers who has parts manufactured in Louisiana also reported no solicitation of business on the part of local shops.

A local foundry producing aluminum castings complained of defective chromium plating on aluminum and high costs of finishing, and knew of no shop in the area which can produce such a finish satisfactorily.

A producer of time-clocks also complained of defective chromium plating and high costs. At the time of the survey, this consumer had his plating done by Atlanta shops but was looking for another source.

A large consumer of chromium plating also reported defective quality and high costs of Atlanta shops. This company has plating done as far north as Connecticut. Other sources used are in New York, Illinois, and Ohio. Another reason why this company uses outside sources is that Atlanta shops cannot handle the complete job, due to lack of proper equipment.

There are other examples as above. High costs and low quality force consumers to seek other sources or substitute materials.

Nickel

Low quality and high costs also limit the market of consumers of nickel plating. Changes in design and substitution of other materials are resorted to. For example, two nickel plate consumers reported that they will use stainless steel in 1950 for the reasons given. Other consumers make similar complaints.

Silver and Gold

One company which produces special machinery has silver plating done in Pennsylvania, because the silver plating done by Atlanta shops costs too much and the quality is defective.

A company producing plastic articles reported it would use a large amount of gold and silver plating if it were economical to do so. No Atlanta shop does such work, and this company is willing to underwrite a development program to enable a local plant to produce such finishes on plastics.

This resume of opinion regarding metal finishing in the Atlanta area reveals, as mentioned before, that the chief faults of the electroplating industry in Atlanta concern the poor quality and the high cost of the finishing. In the latter instance, it would seem that few plants are competent to estimate finishing costs or are aware that work can be done cheaper and better in more remote areas. The available local market for electroplating is large, although only a small part of it is allocated to the local industry.

TABLE VI. TOTAL VOLUME OF PLATING PURCHASED BY ATLANTA INDUSTRIAL CONSUMERS FROM BOTH ATLANTA SHOPS AND SHOPS ELSEWHERE

Type of Finishing	Year			
	1940	1945	1948	1950*
Anodizing	$ 5,000	$ 1,000	$ 8,900	$ 19,550
Cadmium	775	3,090	12,875	20,360
Chromium	8,100	33,840	156,725	478,780
Copper	200	2,300	4,200	6,200
Nickel	1,470	9,945	19,765	27,380
Silver	200	800	500	500
Total Volume	$15,745	$50,975	$202,965	$552,770
Number of Consumers Reporting	27	35	62	58
Average	$ 583	$ 1,456	$ 3,274	$ 9,531

*Data estimated by reporting consumers.

In contrast to the increasing proportion of Atlanta consumption of plating produced elsewhere is the small amount sold by Atlanta shops to other market areas. The job shops reported that about one-half of their total output is sold to Atlanta consumers and the other half to consumers outside of Atlanta. Inasmuch as the aggregate volume of purchases reported by Atlanta consumers from Atlanta shops was approximately $60,000 in 1948, the shipment out of the area should total $55,000 to $60,000. Most of these shipments, according to the job shops, go to cities in the southeastern states.

When the conditions under which this business comes in are realized, the amounts which could be exported to other centers under proper techniques of production and good merchandizing must be many times larger.

The author cannot resist raising the question of the quality of work which is done by plants in the areas into which Atlanta job shops ship their output —whether or not the job shops in the southeastern states can meet plants in other areas on a competitive basis.

Conclusions

The electroplating industry in Atlanta has shown a steady growth since 1940. It has not, however, kept up with the phenomenal expansion of the market for electroplating in the area. Of the $200,000 purchased by Atlanta industrial consumers in 1948, only about $60,000, or approximately thirty per cent went to Atlanta shops. When the $143,000 purchased in 1948

from other cities is augmented by the amount not bought but done by plants for their own use, a large part of which could possibly be available for local job shops if they were equipped to handle the business, the conclusion appears that there is ample demand for further expansion in the job-plating industry in Atlanta.

To get this business, however, the job shops will have to make important changes in their present character and status. They will have to install modernized equipment and processes for faster and top-quality work in order to achieve lower costs if they are to meet competition. Modern systems of cost accounting, long overdue, must also be installed. Adequately trained personnel for both job shops and plants which produce for their own use must be employed if local producers are to keep abreast with latest techniques and processes.

Since several consuming firms reported that they had never even been solicited for business, it appears that these shops are without the technique or means to market their product, even if all other problems were solved. If they are really to sell the Atlanta market and the markets of other cities, which would doubtless be opened to them, the job shops would have to institute not only more aggressive but also more progressive methods and policies in their sales promotion.

With the adoption of these proposed changes and improvements there appears little reason why the job-shop finishing industry in Atlanta should not have possibilities for important expansion to meet the increasing civilian and defense demand.

Recovery of Chromic Acid

(*Continued from page 460*)

ing costs need to be included? For a 10-fold concentration, 900 gal of distilled water would be obtained, at a cost of $11.40.

11.40/900 = $0.012/gal, or $12.00 per thousand gallons (Answer)

The facts set forth above amply demonstrate that recovery of chromic acid by vacuum evaporation is not only a means of solving a waste disposal problem, or extending a short supply of chromic acid, but a hard-boiled business proposition offering many platers an opportunity to increase their earnings. That these figures are practical, conservative if anything, is evidenced by the fact that the first installation of this type paid for itself in less than a year. Unfortunately, the company concerned has a policy which does not permit publication of its cost data.

The success of this process will, it is felt, suggest its extension to other recovery problems, e. g., in nickel plating and chromic acid anodizing. Platers may look forward to a growing use of this technique in spite of rearmament shortages and dislocations.

REFERENCES CITED

[1]J. B. Kushner, Metal Finishing **48**, 75 (May, 1950).
[2]K. G. Soderberg, Proc. Am. Electroplaters' Soc. **24**, 233 (1936).
[3]B. F. Dodge and D. C. Reams, Proc. Am. Electroplaters' Soc. **34**, 249–269 (1947).

Hot Spraying

(*Continued from page 463*)

application. Durability, print resistance, cold check, and cost, in fact, all important details in which the lacquer manufacturer and finisher would be interested were covered in the program. Recently the company made its findings available to all lacquer manufacturers in the country. As a result, better hot lacquers are now being formulated.

Skepticism—Biggest Problem

Unfortunately, previous failures have left behind firm impressions. However, the success that is now being achieved where the hot-spray process is intelligently put to use, is breaking down this skepticism very rapidly.

In a survey conducted by The Hercules Powder Company, Wilmington, Del., a questionnaire was mailed to 325 companies known to be using paint heaters. On the basis of the reports received so far, from 30 per cent of the list, there is an indicated use of over 200,000 gallons of hot finish every month. Seventy per cent of those replying reported material savings; 70 per cent, reduced cost of application; 60 per cent, better quality of finish; 76 per cent, labor savings and 18 per cent, reduced rubbing or polishing.

In addition, the following advantages were written in by those replying to the questions: no blushing, quicker drying, better gloss, and reduced sagging.

A few lacquer manufacturers seem to take the view that the so-called *high-solids cold lacquer* duplicates the performance of hot lacquer and makes the latter unnecessary. This view is questionable, because when high-solids lacquers are heated to their ideal temperature, viscosity is lowered, atomization is more easily accomplished, flow-out is better, the finish has better depth and appearance, and in general the benefits of hot spray are attainable with these formulas also.

Adoption of Hot Spraying

After the proper hot-spray lacquer has been chosen and adjusted with the right solvents, and after suitable paint-heating equipment has been selected and installed correctly, the finisher must approach the hot-spray process with an open mind and be prepared to adjust his spraying technique to take advantage of the process. Spraying hot material requires a special technique, and it should be mastered by the spray operator before attempting production spraying.

There are two systems for adopting the hot-spray process. One is to make the transition to high temperatures at once; the other is to approach it gradually. If the first method poses too many complications, it is advisable to start at a modest temperature setting, such as 110° F, and increase the temperature settings in five-degree stages, each time making compensating adjustments in viscosity and atomization pressure. In this manner, the operators have a chance to adjust themselves gradually to the new process.

Review of the Month

ORGANIC TANK LININGS—An Outline on Care and Maintenance

Manson Glover* and Gunnar Lindh†

The plater who buys a tank with a rubber or Koroseal‡ lining invests a considerable sum in protection. He does this to meet difficult conditions which unprotected metal will not tolerate. Too often he feels that the lining is immune from damage and that he is relieved of worry and responsibility in connection with it, and too often this feeling leads to neglect and neglect to failure. The lined tank is liable to damage from a multitude of overlooked abuses. This outline is intended to point out the more common and to suggest means of correcting them.

Tank Installation

(a) A lining can be ruined when the tank is unloaded or installed. Take positive precautions against dropping or jarring the tank when it arrives and when it is put in place.

(b) Keep the tank off the floor with brick, insulated I-beams, glass block; or set it in a heavy base of acid-resisting compound or on rubber or plastic sheeting. Be sure that the under surface is positively sealed against corrosive seepage.

(c) Protect the outside surfaces with the same material as the lining or at least with corrosion-resistant paint. Protect very heavily the under surface and any sides which cannot be easily reached once the tank is in place.

It has been established that steel plate is porous to hydrogen ions, and these may penetrate to the lining and lead to blisters.
Keep strong acid splash off the steel.

(d) Install with care such fixtures as rod supports and coil hangers. Avoid drilling through flange insulation as much as possible: if it has to be done, use dielectric bushings and seal the cut lining to prevent corrosion from capillary seepage.

(e) Insulated drip pans or splash aprons of thin rubber or plastic will stop damage from dragout between tanks.

(f) Take every precaution against grounding: a minor break in a grounded tank may lead to extensive plating over the insulation. Between the tank and floor supports, place drip shields of rubber or Koroseal sheet, hanging down from the edges to shed liquids but not contacting the floor.

Preventing Mechanical Damage

Breaks in linings lead to rapid spread of damage below them. Deep tanks, heavy work, and heavy anodes call for special care.

(a) Provide a rugged bottom lining. A floor of 3/16-inch sheet is good practice in Koroseal linings and adds little to cost. Loose brick on the bottom will prevent cutting.

(b) Over air-pipe agitators, install fitted grids to keep falling objects off the bottom.

(c) Do not fish for fallen parts with sharp-pointed rakes or hoes. Suitable tank magnets are best for recovering ferrous parts.

(d) Extreme conditions, particularly with high temperatures, call for permanent brick sheathing to take shock and cut down temperature at the lining.

Preventing Heat Damage

Local heat may ruin a tank lining while the average temperature is safe. Cements soften before linings and may blister or let go while the sheet is unaffected. Bright-nickel operation calls for special control.

(a) Keep operating temperatures within stated limits.

(b) Keep coils a full inch clear of a lining by means of lead spacer pads or other separators under and behind the coils. This space, incidentally, will increase the efficiency of heating.

(c) Agitate a solution while it is being brought up to temperature.

(d) If mixing contents generates heat, add chemicals slowly to allow generated heat to pass off. Mixing with ice is sometimes a wise precaution.

(e) Heat the tank from the inside or by heat exchangers. Heating from the outside is dangerous to the cements and is also inefficient because the linings are poor conductors.

(f) Use brick sheathing to decrease high temperatures to the capacities of the linings. Four inches of brick will bring 212° F down to about 150°; eight inches will reduce it to about 125°.

Controlling Corrosion

(a) Empty the tank from time to time and inspect

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†Manager, Plastics Department, The Udylite Corporation, Detroit.
‡Registered Trade Mark of B. F. Goodrich Company.

it carefully for breaks with an electric spark tester. Remove carefully and immediately any metal plated on the lining.

"A small hole in the lining, if not repaired, may lead to a hole in the steel tank necessitating expensive repairs and possibly causing loss of solution. If metal begins to deposit on a tank lining because of a break and is not removed or stopped off, it may spread over a considerable area, causing damage to the lining and loss of metal and current." Saltonstall, PLATING, *January, 1949.*

(b) Watch for a drop in solution level that suggests a leak.

(c) Small breaks can often be repaired by shop personnel if no liquid has collected under the lining. Such breaks in Koroseal sheet are repaired by cautious use of shreds of the same material and an electric soldering iron. Hard rubber can be mended with a soldering iron and "rubber solder".

If liquid exudes under pressure, a break should be repaired by a specialist.

(d) Larger damage should be promptly repaired by professionals.

TANKS SUITABLE FOR LINING

Many tanks will hold water but are not suitable for lining, and rejecting them saves time and money. It is poor practice to put a good lining inside metal which is about corroded through.

(a) Steel for lining must be clean and unpitted to be safe. Porosity which lets air or solvents accumulate can lead to blistering. Avoid laminated plate.

(b) Welds should be air tight, leave no pores, and offer a smooth surface. Welding specifications can be secured from lining suppliers.

INFORMATION NEEDED BY SUPPLIER

There is no all-purpose lining, and a supplier can select the best for a job only if he knows the conditions. An inquiry should therefore include all pertinent information about (1) identity and concentration of corrosive, (2) operating temperature, (3) maximum temperature and its duration, and (4) weight and nature of work and method of handling. Without this information, a supplier cannot be sure of making an intelligent recommendation and cannot be responsible for lining failures.

Consult your supplier about any proposed changeovers: if a tank is used for other than the recommended service, he has no responsibility.

Soak Cleaning Before Alkaline Electrocleaning
A CORRECTION

Through an error, one of the constituents, soap, was left out of the first column of cleaner mixtures of Table I. The constituents should be: caustic, silicate, phosphate, soda ash, soap.

Book Review

DR. HAROLD J. READ
Associate Professor of Metallurgy, Pennsylvania State College

METAL FINISHING GUIDEBOOK-DIRECTORY, 19th edition, 1950, 488 pages. Finishing Publications, Inc., 11 West 42nd Street, New York 18, N. Y. Price, $2.50.

The last edition of this valuable book which was reviewed in this column was the 17th (PLATING, February, 1949). The general remarks on the nature and scope of that volume are applicable to the present edition, and it seems best to discuss here the changes which have been noted during a comparison of the two.

New sections on automatic polishing and buffing, power brushing, barrel burnishing with steel shapes, bright-copper plating, tin plating from the potassium stannate bath, P-R plating, diaphragms, plating on plastics, barrel plating, water control, and automatic plating machines are welcome additions, which assist materially in bringing the book up to date. Revisions have been made in several sections, particularly those on abrasive tumble finishing, solvent degreasing, gold plating, waste disposal, and power sources. The article on plating racks has also been much improved by complete revision, considerable enlargement, and the use of numerous illustrations.

Certain deletions have been made, and these include the sections on arsenic and iron plating, nonmetallic surface coatings, power transmission, wooden tanks, ceramic tanks, and the analyses of arsenic, iron and lead plating solutions. The omission of analytical methods for arsenic and iron is logical enough inasmuch as the plating baths for these metals have been deleted, but the fairly extensive description of lead plating solutions appears to justify the inclusion of a control method for lead in the analytical section of the book.

One notes in successive editions of the Guidebook-Directory an increasing tendency to make the articles considerably more informative with respect to general and fundamental information. In other words, it is becoming more of a reference text for practical shop operation and less of a mere formulary. Along these lines it might be suggested that even more material on the relative advantages and disadvantages of a particular bath for a given metal might be helpful when more than one bath composition is given. It is realized that this is a ticklish as well as difficult task, but its accomplishment would add much to the value of the book. The discussions for some metals are quite good in this respect, but a case in point is palladium where three radically different baths are given with almost no indication as to whether each has a specific field of applicability or whether all are equally good in every respect.

Determination of Impurities in Electroplating Solutions

XXI. TRACES OF LEAD IN ZINC PLATING BATHS

project no. 2

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Acknowledgment is due the Research Committee, Dr. Louis Weisberg, Consulting Chemist, New York City, Chairman; the Research Directing Sub-Committee, Mr. William M. Tucker, Eastman Kodak Company, and Dr. Fred Gurnham, Tufts College, Chairman and Vice-Chairman, respectively; and the Project Committee, Dr. D. Gardner Foulke, Hanson-Van Winkle-Munning Company, Chairman, Dr. Walter R. Meyer, Enthone, Inc., and Dr. Henry B. Linford, Columbia University, for their contributions to this project.

*AUTHORS

Introduction

The purpose of this investigation was to develop a rapid and accurate method for the determination of very small amounts of lead in zinc plating baths which may be contaminated with appreciable quantities of copper, cobalt, chromium, ferric and nickel ions.

A literature survey disclosed no methods more applicable or effective than the one which makes use of the organic reagent, dithizone. This method involves the isolation of the lead followed by the actual quantitative determination of the lead by either the mono-color method, the mixed-color method, the standard-series method, or the colorimetric-titration method. The reader is referred to our previous paper[3] for a complete discussion of these methods inasmuch as the problems presented in the determination of lead in nickel plating baths are similar to the ones encountered in this determination. A working procedure for the determination of lead in zinc plating baths was obtained by making a few modifications in the procedure for the determination of lead in nickel baths.

For this investigation, the mono-color method has been selected, in which the light absorbed by the lead dithizonate at 520 millimicrons is measured, because it is the most rapid and is capable of giving results accurately to 1 microgram when properly carried out[1]. In 1944, a similar method for lead in plating baths was described by Foulke[2].

Experimental Work

Since the conditions for the reaction of lead with dithizone have been established for the determination of lead in nickel plating baths[3], the main consideration for this determination would be the possibility of interference with zinc. Zinc reacts with dithizone in very slightly basic solutions, but it was thought that if the *p*H was kept at *p*H 9 the zinc would not interfere.

In the method for the lead determination in nickel plating baths, either tartrate or citrate ions were added to complex the metals whose hydroxides would precipitate above *p*H 7, so that no precipitate would form when ammonium hydroxide was added. As the zinc cyanide solution is basic from the beginning, there is no need for any addition of citrate or tartrate ions.

The most important factor in any dithizone method is the control of *p*H. It is best to keep the *p*H of the final solution between 9 and 9.2, so that the zinc will not interfere with the lead determination.

If it were possible to reduce easily the *p*H of the cyanide solution to a *p*H of 9 with tartaric acid, that would be the only step necessary for the method. However, to adjust the *p*H properly, it is simpler to add ammonium hydroxide to the solution and then add tartaric acid to bring the *p*H slowly to the desired value of 9.0–9.2, where ammonium tartrate acts as a rather effective buffer.

From the transmittancy curve for lead dithizonate (Fig. 1), which was run with a Beckman spectrophotometer, it was found that the maximum absorption occurs at 520 millimicrons. If a filter is to be used, a green Klett-Summerson No. 54 filter should be employed. Its maximum transmittancy approximately coincides with the wave length band at which the solution shows maximum absorption.

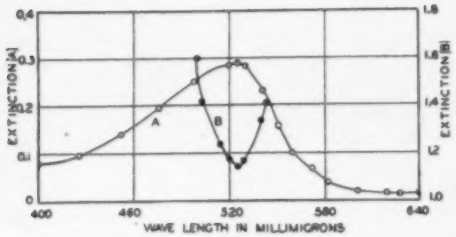

Fig. 1. Extinction vs. wave length for (A) lead dithizonate complex, (B) Klett-Summerson green filter No. 54 (extinction units on the right)

TABLE I. CALIBRATION CURVE DATA

Lead micrograms	Colorimeter Readings	Average Reading	Average Blank	Corrected Reading
10	163, 157, 161	161	100	61
20	220, 220, 230	225	100	125
30	400, 405, 396	400	200	200
40	460, 463, 457	460	200	260
50	520, 530, 509	520	200	320

and hence its use will result in the highest sensitivity of the method.

PREPARATION OF CALIBRATION CURVE

To prepare the calibration curve, 1 ml of the standard pure zinc plating bath described below is pipetted into six 50-ml beakers, and 0, 10, 20, 30, 40, and 50 micrograms of lead, as lead nitrate, are added to each beaker respectively. Ten ml of water, 3 ml of conc'd ammonium hydroxide, and 7 ml of 5 per cent potassium cyanide solution are added, in order, to each beaker, and the *p*H is adjusted to 9–9.2. Then the lead in each solution is extracted by shaking with dithizone solution, and the transmittancy of each lead dithizonate solution is determined.

The data obtained for these solutions are shown in Table I.

By plotting the corrected readings against the corresponding amounts of lead, one obtains the curve shown in Fig. 2. The resulting straight line shows that the Bouguer-Beer's Law is obeyed over the concentration range tested.

RECOMMENDED ROUTINE PROCEDURE

The procedure finally adopted for the routine analysis of lead in zinc plating baths is the following:

Reagents Required

1. Dithizone Solution. . .0.015 per cent
   Weigh out 150 milligrams of dithizone in a 100 ml beaker. Break up all lumps and add 50 ml of carbon tetrachloride. Stir the mixture well and then filter the solution through a Whatman No. 41 paper to remove insoluble material. Pour the filtrate through the filter several times before transferring the filtrate to a 150-ml Squibb-type separatory funnel. Add 50 ml of a 1:100 solution of ammonium hydroxide and shake for about one minute. After the liquids have separated, run the carbon tetrachloride layer into another separatory funnel containing 50 ml of the 1:100 NH_4OH and shake again. This second extraction will remove practically all the dithizone from the carbon tetrachloride layer. It should be colorless or have a light-green color at this point. Discard the carbon tetrachloride layer and combine the two aqueous NH_4OH extracts. Wash these extracts four times with 10-ml portions of carbon tetrachloride. This will remove any diphenylthiocarbodiazone present. Now precipitate the dithizone with 2 ml of conc'd hydrochloric acid and shake for one minute. Finally, extract the precipitated dithizone with 25-ml portions of carbon tetrachloride until the aqueous layer becomes colorless. Run these extracts into a pyrex liter flask and dilute to one liter with carbon tetrachloride. To protect the solution against oxidation, overlay it with a 5 per cent solution of pure hydroxylamine hydrochloride, one centimeter thick. Keep the solution in a cool, dark place. It is stable for several months if kept in a refrigerator.
2. Potassium cyanide solution—5 per cent
   Dissolve 50 g of the fresh salt in sufficient water to make 1 l of solution. Keep the solution in a pyrex flask or bottle.
3. Alkaline potassium cyanide solution
   Mix 10 ml of the 5 per cent KCN solution and 5 ml of conc'd NH_4OH and dilute to 1 l.
4. Concentrated ammonium hydroxide —cp grade
5. Tartaric acid—50 per cent
   Dissolve 25 g tartaric acid in distilled water and dilute to 50 ml.
6. Thymol-blue indicator
   The indicator is used if a *p*H meter is not available.
7. Standard lead solution—10 micrograms/ml
   Dissolve 100 mg pure test lead in 2 ml of 1:1 HNO_3. Transfer the lead nitrate to a liter flask with thorough rinsing of the 50 ml beaker in which the lead was dissolved. Add 5 ml glacial acetic acid, dilute to the mark with lead-free water and mix well. Dilute 10 ml of this solution to 100 ml. The diluted solution contains 10 micrograms lead per ml. Lead acetate or lead nitrate may be used for preparing the standard lead solution, but because of uncertainty about the amount of moisture and water of crystallization that the salts may contain, it is best to use pure lead.
8. Perchloric acid—conc'd
9. Hydroxylamine hydrochloride—10 per cent
   Dissolve 10 g of the salt in distilled water and dilute to 100 ml.
10. Standard pure zinc plating bath
    Dissolve 60 g $Zn(CN)_2$, 22 g of NaCN, and 52 g of NaOH, all of cp grade, and fill to the mark of a 1 l flask. Filter off the precipitate that forms.

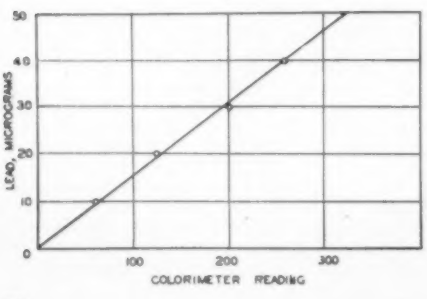

Fig. 2. Calibration curve for determination of lead in zinc plating baths by the dithizone method. Instrument used: Klett-Summerson colorimeter with green filter No. 54. Final volume of solution: 25 ml

Apparatus Required

1. *p*H meter or its equivalent
2. Two 60–100-ml short-stemmed separatory funnels (Squibb type)
3. Pipettes and burettes
4. Beakers of 50-ml capacity
5. Klett-Summerson colorimeter with green filter No. 54 or any other photoelectric colorimeter

Procedure

For routine control work, the following procedure should give satisfactory results if followed closely.

Adjustment of *p*H

1. Pipette 1 ml of the plating bath into a 50-ml beaker.
2. Add 10 ml of water.
3. Add 3 ml of concentrated NH_4OH.
4. Add 7 ml of 5 per cent KCN solution.
5. Measure the *p*H of the solution with a *p*H meter, and adjust it to 9–9.2 with tartaric acid or NH_4OH from a dropping bottle. If thymol-blue indicator is used, add 5 drops of it at this point and adjust the acidity until the solution is greenish in color.

Separation of lead

6. Transfer the contents of the beaker to a 150-ml Squibb-type separatory funnel and rinse out the beaker three times with small quantities of water.
7. Add 5 ml of dithizone solution from a burette, shake for 30 seconds, allow the layers to separate, and run the solvent layer into another clean separatory funnel.
8. Repeat the extraction with 5-ml portions of dithizone until the dithizone remains green in color. This indicates that all the lead has been extracted.
9. Add 20 ml of alkaline potassium cyanide solution to the combined extracts.
10. Shake for 30 seconds, allow the layers to separate, and draw off the carbon tetrachloride layer into a 25-ml volumetric flask.
11. Dilute the carbon tetrachloride solution to the mark with pure solvent and shake well.

Measurement of transmittancy of the lead dithizonate

12. Filter the solution through a clean Whatman No. 40 paper. Catch the filtrate in a clean, dry Erlenmeyer flask.
13. After the colorimeter has been adjusted with pure carbon tetrachloride as the reference liquid, transfer a portion of the filtrate to a matching test tube. Rotate the dial until the galvonometer needle returns to the zero position and record the scale reading. If the instrument has a wave length scale, set it for 520 millimicrons.
14. Run a blank, going through the aforesaid procedure with the same number of dithizone extractions as were required to extract the lead. Record the scale reading of the blank. It is essential in running the blank to use as many extractions with dithizone as in running the regular sample, because the reading of the blank increases as the number of required extractions increases.
15. Subtract the blank reading from the sample reading. Record this corrected scale reading, and from the calibration curve, read the amount of lead in the sample taken for analysis.

Calculations

Suppose that the corrected scale reading of the unknown is 200. According to the calibration curve, this corresponds to 32.5 micrograms of lead. As one ml of the bath was taken for analysis, 32.5 × 1000 = 32,500 micrograms/l or 32.5 ppm of lead is present in the bath. This is equal to 0.0325 g/l.

If a solution is known to transmit light in accordance with Bouguer-Beer's Law and the instrument has a logarithmic scale, it is possible to eliminate the need for a calibration curve.

An example will make the method clear. Run an unknown and a standard sample, simultaneously treating each exactly the same. Get their scale readings and correct for blanks as described above. As the readings for both the standard and unknown are directly proportional to the concentration if the Bouguer-Beer's Law holds, the concentration of the unknown is calculated by the use of the following formula:

$$\frac{\text{Concentration if standard}}{\text{Corrected reading of standard}} \times \text{Reading if unknown} = \text{Concentration of unknown}$$

Suppose the standard contains 20 micrograms of lead and gives a corrected reading of 125. The unknown—using 1 ml of plating bath—gives a corrected reading of 175. Substituting these numbers into the formula, the amount of lead in 1 ml of the bath under test is (20/137) × 175 = 28.0 micrograms. Hence, in one liter there is 28.0 × 1000 = 28,000 micrograms = 28.0 ppm or 0.028 g/l of lead.

Once the standard has been run, it is not necessary to run it with each unknown—although it would be desirable—

because $\frac{\text{Concentration of standard}}{\text{Corrected reading of standard}}$ is a

constant. It would only be necessary to multiply the scale reading of an unknown by this constant factor to get the concentration of lead in the unknown.

ACCURACY AND PRECISION OF METHOD

To check the accuracy and precision of the lead method under conditions that will be similar to those met in commercial work, small amounts of various salts were added to 100 ml of the standard pure zinc plating bath, and the accuracy and precision of the method were determined in the presence of such of the impurities as were held in solution in this bath. Table II shows the ions and the quantity of each that were added to the bath.

The ions were added as solid chlorides or nitrates whenever possible. The chromium was added in the form of $K_2Cr_2O_7$. The salts did not dissolve completely, so the mixture was heated, shaken well, and then cooled. It was then filtered, and the

TABLE II. KIND AND QUANTITY OF IMPURITIES ADDED TO PURE BATH

Ion	Quantity mg	Concentration g/l
Chromium...	20	0.2
Cobalt.....	100	1.0
Nickel.....	100	1.0
Copper.....	40	0.4
Iron (Fe^{+++})	100	1.0

TABLE III. ACCURACY AND PRECISION TESTS

Lead Added micrograms	Corrected Colorimeter Reading	Lead Found micrograms	Error per cent
10	60	9.4	−6
20	115	18.2	−9
50	320	50.0	0
23.5	145	22.7	−3.4
23.5	150	23.5	0
23.5	145	22.7	−3.4
23.5	140	22.0	−6.3

filtrate was used for the precision and accuracy tests.

The "Recommended Routine Procedure" was employed, and Table III shows the results obtained.

The average accuracy of the lead method is approximately 4 per cent, with the biggest error being 9 per cent. The procedure, however, must be followed accurately to give good results.

An additional check on the accuracy that can be expected was made by sending samples of a test solution to several concerns for analyses by this method. The companies that kindly consented to analyze the test solution were Bethlehem Steel Company, Bethlehem, Pa.; Michigan Bumper Corporation, Grand Rapids, Mich.; and E. I. duPont de Nemours & Company, Niagara Falls, N. Y. The results obtained by these companies and the writers are given in Table IV.

TABLE IV. RESULTS BY COOPERATING LABORATORIES

Company	Lead ppm
A	24
B	23
C	22
D	23

"Stop and Go" Method

1. Follow the recommended routine procedure up to and including step 6. Adjust the *p*H well.

2. Add 2 ml of dithizone solution from a burette and shake the sample for 30 seconds. Allow the layers to separate and run the bottom carbon tetrachloride layer into a second clean separatory funnel.

3. Continue the extraction with 1-ml portions of dithizone, recording the number of extractions required including the first one, until the dithizone remains green in color.

4. Run a series of five lead standards ranging from 10 to 50 micrograms of lead, and determine the number of extractions required for each.

5. By comparing the number of extractions required for the unknown solution with the extractions required for the standard lead solutions, the amount of the lead in the unknown can be estimated to within 10 ppm. For example, if an unknown lead solution required three extractions, and a standard lead solutionn containing 30 ppm also required three extractions, it would be estimated that the unknown solution contained 30 ppm of lead.

Applicability to Other Zinc Baths

This method can also be used for the determination of lead in zinc sulfate baths. Approximately 10 ml of a 10 per cent sodium tartrate solution should be added to complex the iron that is present, before the solution is made alkaline. The solution is made alkaline by adding concentrated NH_4OH. After this step, the analysis follows the same procedure as is given for the determination of lead in zinc cyanide baths.

Summary

A method for the determination of lead in zinc plating baths is described. The lead is separated from interfering ions by extraction with a carbon tetrachloride solution of dithizone in the presence of potassium cyanide. After removal of the excess dithizone with alkaline potassium cyanide solution, the transmittance of the carbon tetrachloride solution is measured and the quantity of lead present determined from a calibration curve.

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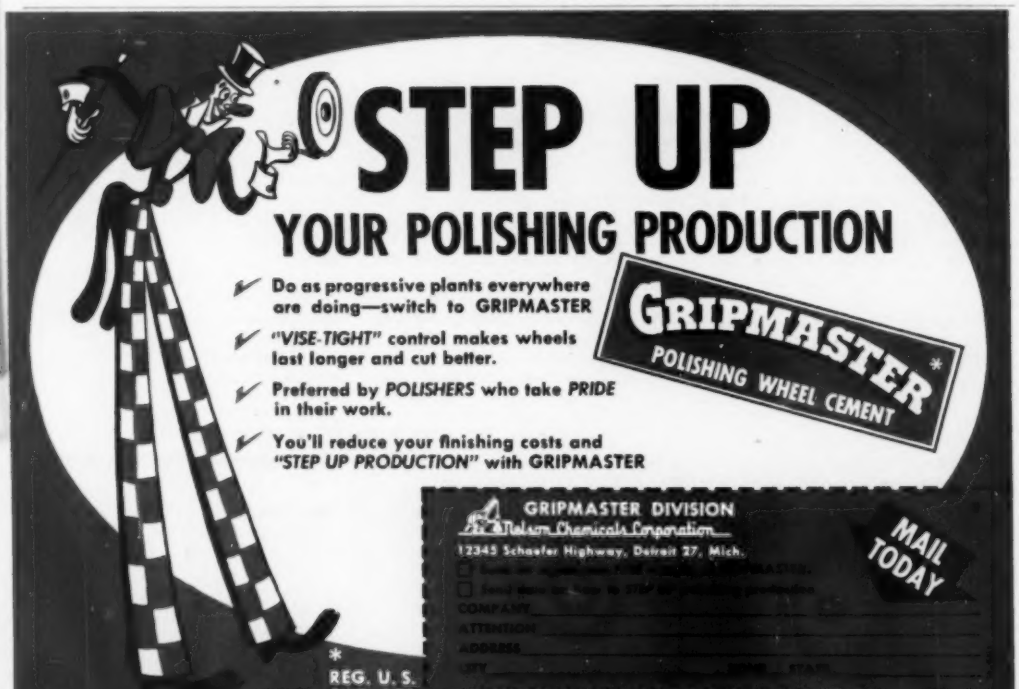
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Washington Orders

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Cadmium.—Order M-19 was amended on March 16 to permit the use of cadmium plate on synthetic-yarn and cotton twisters and on high-carbon (steel) wire for carding. The permission to use cadmium plate on ferrous springs was extended to include lock washers, with previous limitations. Some non-plating uses of cadmium were also added. The signed certification which a seller must receive before making delivery was amended.

Chemicals.—A general chemical allocation order, M-45, dated March 16, sets up a mechanism for allocating scarce chemicals but does not in itself place any chemical under allocation. That will be done by amendments to this general order, which will place a given chemical in one of three allocation categories, Appendix A, B or C. Both supplier and purchaser will be required to apply to NPA for authority to fill any order for an Appendix A chemical, regarded as most critical. To get an Appendix B chemical (less critical) the purchaser will only need to certify the use of the chemical to his supplier, and the supplier will apply to the NPA for the allocation. Appendix C chemicals, of intermediate criticalness, require Appendix A handling of large purchases, Appendix B handling of small quantities. DO ratings will be superseded when a chemical is placed under allocation.

Copper.—Order M-12, dealing with the use of copper and copper-base alloys, was amended on March 9. It limits use of copper, copper-base alloys, brass-mill products and copper-wire-mill products during the calendar quarter beginning April 1 to a total of 75 per cent of the average quarterly use during the base period and the monthly use to 40 per cent of the permitted use. The average quarterly use of foundry products is limited to 100 per cent of the average quarterly use during the base period. The list of prohibited uses remains unchanged.

Directions 1 and 2, M-12, as amended on March 14 and 27, respectively, permit users of copper and copper-base alloys to make adjustment in the base period if production were shut down during the base period for more than 15 consecutive days. This permission extends through the second quarter of 1951.

The further amendments to M-12, of April 1 and 9, permit the sale of List A and B components which have been manufactured from copper not suitable for permitted uses. They also permit purchase of such components and their assembly into completed products included in List A or B, provided they are not suitable for use in permitted items.

Certification of use is no longer required in connection with delivery of copper forms and copper products to purchasers of quantities weighing 25 lb or less or in connection with the delivery of scrap. The amendments also add some items (not plated) to the permitted uses.

Cotton Duck.—According to Order M-53, issued on March 31, a producer must now accept in the second and following quarters rated orders for cotton duck (which includes filter duck or twills, plied yarn) to the extent of 80 per cent of his quarterly production. It is hoped to increase the production by conversion of carpet and upholstery looms to duck weaving.

Lead.—M-38 was amended on April 3 to limit the use of lead, lead-base alloy containing 50 per cent of pig lead or more by weight, and products produced from such lead or lead alloy, by any person, to such purposes as for which he used them during the 6-month base period ending June 30, 1950. In addition, such use during any month is limited to 100 per cent of the average monthly use during the base period. These prohibitions do not apply to rated orders or to persons using less than 5 tons of pig lead, lead-alloy, or lead product in any month. Permitted inventories are reduced from 60 to 30 days' supply. Scrap toll and similar agreements must be approved by the NPA.

Metal working machines—NPA Order M-41, dated February 28, 1951, regulates the delivery of certain new metalworking machines having a producer's list price of $500 or more. The list of machines includes grinding, polishing and buffing machines. The provisions of the order controls to the extent that it conflicts with NPA Regulation 2, but in all other respects Regulation 2 continues in force. Delivery of replacement parts continues to be controlled solely by NPA Regulation 4.

Order M-40, of the same date, authorizes the placing of "pool orders" for the same equipment by the General Services Administration of the U. S. Government, and provides that such orders shall carry a DO rating, which may be extended.

Nickel.—The Costume Jewelry Manufacturers Industry Advisory Committee, at a meeting with NPA officials on February 28, asked that nickel be allowed for undercoatings for precious metals.

Order M-14 was amended on March 31 to continue the limitation on consumption of primary nickel for nonrated orders at 65 per cent of the user's average quarterly use during the first six months of 1950. The NPA pointed out, however, that supplies were insufficient to meet this allowance and that it may become necessary to allocate nickel during the second quarter.

The amendment adds a new list B of prohibited items, including nickel plating on certain hardware, namely, collars and tags for pets, and bolts, washers and similar fastening devices; household appliances (except parts subject to abrasion or heat and except the strike prior to silver plating or vitreous enameling), namely, cooking stoves and ranges (except door and drawer handles); electric houseware including heating and cooking appliances, motor-driven and personal appliances, home and farm freezers, laundry equipment including clothes driers and ironing machines, and sewing machines; among metal furniture and fixtures, commercial furniture and fixtures, not only decorative parts for same as in List A; hub caps for motor vehicles, which were permitted in List A; bicycle handles, sprockets and hubs; juke boxes; insignia, buttons, buckles, decorations, awards and badges (except military).

The prohibitions do not apply to the use of nickel anodes if they were in the inventory of the person doing the nickel plating on March 1, 1951 in the case of List A or on April 15, 1951 in the case of List B. The component parts of items in the two lists may be sold, and the purchaser may assemble them if the components are wholly unsuitable for a permitted use.

Platinum.—Order M-54, dated March 31, prohibits the purchase of platinum for speculative or investment purpose and prohibits its delivery or acceptance for use in a long list of consumer items, including jewelry, and in all plating except for functional purposes. The prohibition does not apply to platinum in inventory on April 1, but those who use such platinum must prepare and keep certain records. Platinum inventories are limited to a 60-day supply or a "practicable minimum working inventory", whichever is less.

Rubber.—NPA Order M-2, as amended on March 1, places overall limits on the consumption of dry natural rubber, natu-

(*Continued on page 502*)

Graphic Arts Monthly

Steps in Gravure Printing

By S. E. Sanguinet

THE process of gravure printing is steadily growing in favor in the production of a wide variety of publications and of quality direct mail literature, as well as in the printing of Sunday supplements. For pictorial or art reproduction gravure is popular, because its 150 screen gives the finest of detail reproduction. ¶ Surprising as it may appear, the percentage of account executives in advertising agencies, advertising managers of corporations and of newspapermen who have anything more than a hazy idea of the gravure process of printing is very little. ¶ This series of pictures shows how one resourceful Detroit art student (Lois Bishop) solved her desire to see exactly how the studio art is finally reproduced in rotogravure. The camera catches her as she is shown each step by the plant superintendent (Bob Hazzard), of the Detroit Gravure Company. ¶ The process is, of course, a deep etch in reverse on copper cylinders. It involves, in preparing the copper cylinders, one of the two major applications of the science of electroplating in the graphic arts industry, as shown in picture 1.

1. Here is the first step in the gravure printing process—the cylinder, slowly revolving in the plating tank, is having its copper shell electrolytically deposited to specified thickness. Plating time is about one hour. 2. The electroplated copper shell is then given a high polish by a buffing machine. 3. The material for the printed page, having been assembled and photographed onto a gelatin negative, the next step is to position the gelatin negative with its paper backing on the highly-polished copper cylinder. The upper roller supplies carbon pressure for the necessary adhesion of the delicate negative. 4. The gelatin negative having been positioned, the paper backing is removed, leaving the negative exposed for etching. 5. The next step is to mask all portions of the shell where packing is not desired. This is known as "stopping." The masking material is resistant to the acid bath. 6. When the stopping is finished, the cylinder is placed in the tank and revolved slowly. The operator is observing how the acid is applied to the gelatin negative and etches it in reverse into the copper in the form of tiny dots. These dots, when the cylinder is rolling in the press, pick up ink that, in turn, transfers the images to form the printed page. 7. Finally, the completed cylinder is in place in a high-speed rotogravure press and, above is the printed page. A standard roto cylinder will carry 16 pages the size of the usual Sunday rotogravure section. If heavy runs are involved, the cylinders are given a surface plating of nickel or chrome.

PUBLICIZING THE PLATING INDUSTRY

In the February issue of PLATING we presented a brief outline of what had been accomplished during 1950 by the Public Relations Committee of the American Electroplaters' Society in publicizing the industry.

Articles continue to appear in various magazines. They aim at presenting some interesting application of electroplating in making better products for consumer use. Illustrative of what is being done are two articles that are reproduced here in reduced size. The one on tin cans, published in Popular Science Monthly, reached some 2,000,000 readers; the one on gravure printing, a reading public of some 100,000. Other articles are in preparation, and still others are in publishers' hands and scheduled for publication.

Over 28 magazines have so far carried such illustrated feature material. Included among these might be mentioned *Popular Science Monthly*, *Motor News*, *Quick*, *Think*, several of the major metropolitan Sunday gravure magazines. Other material has appeared in such important trade publications as *Steel*, *Iron Age*, *Automotive News*, *Product Engineering*, *The Michigan Manufacturer*, *The Graphic Arts Monthly*, *American Metal Market*.

Periodically, a series of *News Releases*, each comprised of from three to four "Plating Briefs" (see illustration) are being mailed to between 250 and 300 daily newspapers throughout the nation. The mailing list for these brief plating facts is now being extended to a preliminary list of weekly and semi-weekly newspapers in one State to discover how acceptable they may be to this type of newspaper. So far, our clippings show a steady rise in the number of newspapers making use of these releases. It is felt that this type of short plating items are extremely valuable in attaining our objective.

A special newspaper release dealing with how a car owner can easily help prevent damage to the exterior plating on his car at this time, when new chromium plating largely promises to disappear off the car market, has recently been prepared and sent to automotive-page editors.

The Committee would again like to ask those who carried out plating on defense items during World War II to describe briefly what they did and send the data to Mr. W. M. Phillips, General Motors Research Laboratories, 485 W. Milwaukee Avenue, Detroit 2, Mich. The information will be used in the preparation of an article on the potential of the plating industry in the current defense effort.

POPULAR SCIENCE

August, 1950

1 THE CAN BEGINS at plating mill where steel coils is given thin coating of tin as it passes through electrolyte bath. Ninety-pound bar of pure "pig" tin above serves as anode, source of the tin.

2 ELECTROPLATING METHOD, here of various steel to save tin, really speeds process. This 400-foot installation at Weirton Steel Co. turns out tin-plated strip at rate of 2,500 feet a minute.

53 Million Tin Cans Every Day

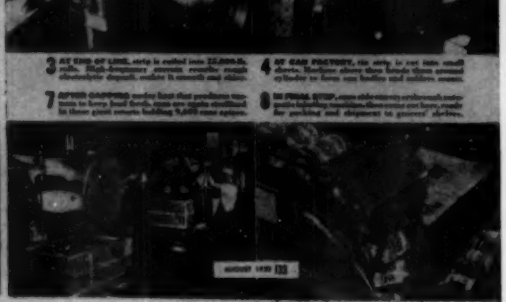
BEHIND the cans you use—53 million every day—are scores of complicated machines and miles of clattering conveyors. The body steel is first plated with tin to keep it from rusting. Then it is punched, pounded, beat, and squeezed into the shape of a can. Finally it is cleaned, filled, capped, and labeled. Yet if all the machines were joined in a single assembly line, it would take only minutes to turn a bare sheet of steel into a finished can of your favorite soup. That's how fast they work—and that's why over 40,000 products, in the food industry alone, can be packed into about 20 billion cans every year.

3 AT END OF LINE, strip is coiled into 25,000-lb. rolls. High-frequency current speeds through electrolyte deposit, makes it smooth and shiny.

4 AT CAN FACTORY, tin strip is cut into small sheets. Machine above then bends them around cylinder to form can bodies and soldiers seams.

7 AFTER CANNING, cases first that produces machines to keep food fresh, cans are again sterilized in three giant retorts holding 5,400 cans apiece.

8 IN FINAL STEP, cans ride silently on branch conveyor to loading room. Here cases are here, ready for packing and shipment to grocers' shelves.



Electroplated Phosphorus Alloys Give Hard Coat

A COMMERCIAL method for producing electrodeposits of cobalt or nickel alloyed with 15 pct phosphorus has been developed by the National Bureau of Standards. These plating baths operate at a pH between 0.5 and 1.5, depending upon composition. Phosphorus alloys are more easily deposited than chromium and are quite hard, corrosion resistant and bright. It is believed that this method of plating will find applications which require a hard wear resistant surface or decorative finish.

Desired acidity in the cathode film of the bath is attained by buffering the solution. Phosphoric acid is one of the best chemicals for this purpose. Baths are kept at a temperature above 160°F because at lower temperatures the cathode current efficiency is very low and the deposits have a tendency to be weak. Current densities run between 5 and 40 amp per square decimeter.

Hardness of these deposits varies from 350 to 720 Vickers and increases with phosphorus content. The alloy may be heat treated at 750°F for additional hardness. Deposit structures are of a columnar type which, when heat treated, developed a fine grain structure instead of the large crystals typical of pure nickel or cobalt.

IRON AGE
NEW YORK, N. Y.

This Clipping From
AM. MACHINIST
NEW YORK, N. Y.

Nine Plate

LATEST STATISTICS: Bright chrome plating on exteriors of last year's autos would cover a strip 3 ft wide around the world at the equator, says American Electroplaters' Society. Also, more than 18 million sq ft of electroplating was used on last year's output of telephone equipment alone.

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A complete line of production buffing compounds. Produced in bar and tube form. Formax is the originator of the "Spraymax" Liquid Compounds for brush or spray application.

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Ready to use. Requires no heat. Dries at room temperature. Increases polishing wheel life. Costs less per pound. Use with all grit sizes.

★ **CONTACT WHEELS**
Style C-20. For contour and straight polishing operations—used in conjunction with Back-Stand Idlers and Coated Abrasive belts.

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Article Abstracts

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Nickel Pickling in the Porcelain Enamel Industry. J. M. Zander, Electroplating and Metal Finishing **3**, 446–449 (August, 1950).
Describes use, operation, and control of nickel dip baths in preparing steel surfaces for porcelain enamelling. Data are tabulated and plotted.

Investigation of Electrodeposition of Manganese. Part II. M. Perec. Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa **2**, no. 2, 93–99 (1950).
Effects of ferrous, ferric, lead, nickel and copper ions on current efficiency in the above were investigated. Cathodic polarization curves were determined for a bath with cobalt additions, and for $(NH_4)_2SO_4$ and Na_2SO_3 baths. Describes rapid polarographic method for cobalt determination in the bath for hydrometallurgy of manganese.

Surface Finish and the Designer. Roy P. Trowbridge. Product Eng. **21**, 122–127 (September, 1950).
Describes practical aspects of a new approach to the measurement, specification, and application of surface-finish control of metallic parts. Types of instruments, standards for various production methods, and physical properties relating to condition of the metallic surface are compared and evaluated.

Electrochemical Behavior of Zinc and Steel in Aqueous Media. Part II. R. B. Hoxeng. Corrosion **6**, 308–312 (September, 1950).
Shows that constituents present in natural waters have a pronounced effect on the electrochemical behavior of zinc. In laboratory tests it was found that the effect of cadmium, even in small amounts, was to shift the potential of zinc in the anodic direction. Silicate additions likewise promote anodic zinc potentials, tending thereby to decrease the possibility of reversals in zinc-steel couples. Additional laboratory data confirm earlier evidence that temperature is secondary to electrolyte composition in its effect on the above.

"AC"—A New Corrosion Test. Thomas E. Lloyd. J. Metals **188**, 1092–1093 (September, 1950).
The alternate-condensation method described appears to offer a technique more comparable to normal weather corrosion than any yet devised. Unlike other methods, it uses a condensate rather than a dip or a spray to effect corrosive action. Equipment is illustrated; procedure is described in detail.

Disposal of Cyanides by Complexation. David Milne. Sewage and Industrial Wastes **22**, 1192–1199 (September, 1950).
The possibility of safe disposal of cyanide rinse waters

PENNSALT CHEMICALS

METAL CLEANING DIGEST

for men interested in Metal Cleaning Economies

FAST, DEPENDABLE CLEANING BOOSTS PRODUCTION RATES

Today's stepped-up production schedules demand fast, right-the-first-time work in *all* departments. Cleaning operations are no exception.

A manufacturer of aluminum molding and trim was having trouble meeting production schedules. A little investigating showed that despite an excellent power washer, material was coming through with spots and "etched" pit marks. Naturally this slowed up the whole production line.

SPRAY HEADS CAUSED SPOTTING

At first the cleaner itself was blamed, but then a Pennsalt representative discovered that scale had built up in the spray heads, just enough to cause incomplete cleaning from time to time.

To descale the washer, the make-up tanks were rinsed out and charged with a solution of Pennsalt Cleaner PM-90,® a specialty liquid descaler. This solution was heated to 140°F. and circulated for one hour. Then the washer was rinsed and put back in service. This marked the end of the faulty cleaning, and production rates jumped back to normal.

CLEANER BREAKDOWN PROBLEM SOLVED

And a careful study of cleaning methods did the same thing for a manufacturer of machined and lapped steel castings. The problem here was to clean the parts of steel chips, oils, soil and lapping compound. As production mounted, it seemed impossible to obtain clean, smut-free surfaces, especially after several hours' operation.

There was nothing wrong with the design or application of this plant's one-stage washing machine. However, several different brands of cleaners had been tried, but the high production rate always caused cleaner breakdown. After a careful analysis of all soil and equipment factors, the Pennsalt man recommended the *proper* Pennsalt Cleaner for this specific application. Now all parts come off the conveyor belt clean, hour after hour. Result: Boosted production.

Pennsalt PRF® Cement successfully resists even the strongest pickling liquors. The tank pictured handles waste H_2SO_4, HCl, HF, HNO_3 as well as caustic, alkalis and petroleum solvents. Maintenance on this tank, built of acid-proof brick laid in Pennsalt PRF Cement, has been nil for over 5 years.

PENN SALT
Industrial Chemicals

PENNSYLVANIA SALT MANUFACTURING CO.
WIDENER BUILDING • PHILADELPHIA 7, PA.
Progressive Chemistry for over a Century

Electronic Products Manufacturer Beats Trichloroethylene Scarcity

Results from a one-minute vapor degreasing operation on coils of wire were not good. A longer exposure to the solvent vapors might have solved the problem, but production schedules had to be met.

A Pennsalt service representative was consulted. After studying the factors, including the characteristics of the drawing lubricant being used for this nickel wire, he recommended a 30-second bath in a 180°F. water solution, containing 4-oz./gal. Pennsalt Cleaner #85.

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2. Additions are accurate throughout the drum. Thus you have fewer rejects due to poor balance. For example, poorly balanced solutions frequently leave smut, or cause poor rinsing.

3. Since Pennsalt Cleaners are virtually 100% active ingredients, fusing gives you the advantage of all the components which are balanced for best performance in many different jobs.

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Article Abstracts

by combining with nickel-bearing rinses to form the tightly bound nickelocyanide complex is discussed. The theory of complex-forming reactions is outlined, and the equilibria existing during operation of the treatment process are considered.

The Reductive Dissolution of Ferric Oxide in Acid. Part I. The Reductive Dissolution of Oxide Films Present on Iron. Part II. The Reductive Dissolution of Powdered Ferric Oxide. M. J. Pryor and U. R. Evans. **Part III. The Mechanism of Reductive Dissolution.** M. J. Pryor. J. Chem. Soc. **1950,** 1259–1286.

In Part I, it is shown that when oxidized iron is immersed in dilute acid and α-ferric oxide is destroyed by auto-reduction, the rate of destruction diminishes with increase in film thickness, with increase in *p*H, and with decrease in temperature. Activation energy is calculated. Potential measurements show that reductive dissolution is highly polarized, and that polarization increases with a rise in *p*H. In Part II, it is shown that both rate and current efficiency of reductive dissolution of α-ferric oxide powders diminish with increase in temperature of previous ignition, with increase in time of reduction, and with increase in *p*H of the electrolyte. Concludes that at *p*H values below 2.0 the rate is controlled by surface conductivity of the oxide and hence by number of surface defects. Part III summarizes the conclusions and suggests a mechanism for the reaction.

Halides as Acid Pickling Inhibitors. Karl F. Hager and Morris Rosenthal. Corrosion **6,** 344–346 (October, 1950).

Describes investigations of the mechanism of retardation and acceleration of acid pickling of ferrous metals by addition of halogens and halides. Inhibition was found to increase with increase in atomic weight of the halogen atoms. Rate of oxide removal on rusted ferrous-metal surfaces was not noticeably affected. Tests on mild steel show that further research on use of halides as pickling inhibitors is warranted.

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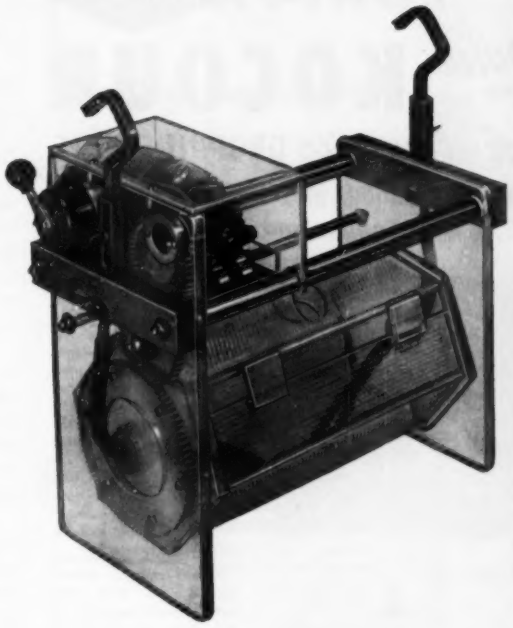

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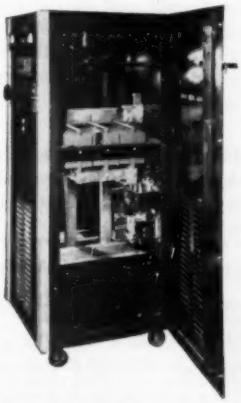

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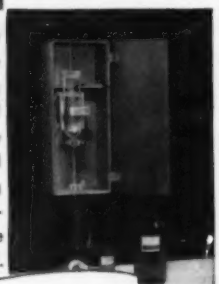

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Article Abstracts

Dental Company Finds Plating Practical on Aluminum Die Castings. Die Castings **8**, 58–59 (October, 1950).
Outlines procedure used for applying various metals by Weber Dental Mfg. Co., Canton, Ohio. A zinc immersion coating is first applied.

The Electroplating of Metallic Selenium. A. Von Hippel and M. C. Bloom. J. Chem. Phys. **18**, 1243–1251 (September, 1950).
Discusses the polymorphism of selenium ions in selenious acid solution; cathodic deposition of the amorphous and metallic phases; nucleation characteristics and crystal growth of the metallic modification; properties of various types of plating baths; a selenium-carbon anode for the stabilization of bath composition; and finally, a number of influences affecting crystallization habit of the deposit. 25 ref.

Contribution to the Study of Electrolytic Zinc Plating. Jean Ginguene. Metaux & corrosion **25**, 156–163 (June, 1950).
Influence of cyanide in the bath was experimentally investigated. Comparative data are charted, tabulated, and discussed. Includes photographs and macrographs.

Dry-Cell Rectifier for Use in the Electroplating Industry. Effect of "Curve Forms" of the Bath Current on Deposit and Current Yield. Julius Steiner. Z. Elektrochem. **54**, 307–314 (July, 1950).
Effect of a-c components superimposed on dc on structure of electrodeposits and current yield was investigated. The experiments were made with ac, half-wave and full-wave rectified; with acid copper, nickel and zinc baths; and with cyanide-copper baths. Includes photographs and diagrams.

Treatment of Plating Wastes at Electric Auto-Lite Plant, Lockland, Ohio. Allen Reed. Sewage and Industrial Wastes **22**, 1338–1342 (October, 1950).

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MOTOR GENERATORS Reliably Rebuilt 1 Year Guarantee

6/12 VOLTS
1—3000/2500 A., Optimus, 490 RPM.
1—1000/500 A., H-V-W, 1150 RPM.
9—125 A., Hobart, 6 volts.

15 to 25 VOLTS
1— 200 A., 15 V. Master
1—1000A., 15 V. Gen. Elec.
1— 300 A., 15 V. Star
1— 750 A.,20 V. M. G. Corp.
1— 800 A., 22/33 V. Gen. Elec.

24 VOLTS
2—1500 A. Century
1—2500 A. Gen. Elec.
2—3000 A. Electric Products

1— 600 A., 24 V. Reliance
1— 200 A., 25 V. Star
1— 300 A., 25 V. Star
1— 175 A., 25 V. Cr. Wh.

32 to 60 VOLTS
1— 500 A., 32 V. Columbia
2— 100 A., 30 V. Gen. Elec.
1— 200 A., 30 V. West.
2— 200 A., 32 V. Gen. Elec.
2—1500 A., 32/40 V. Century
1—1000 A., 33 V. Gen. Elec.
2—1000 A., 40 V. Chandeysnon
2— 200 A., 42 V. Gen. Elec.
3—1500 A., 45 V. Century
1—1500 A., 50 V. Gen. Elec.
2— 800 A., 50 V. Gen. Elec.
1— 400 A., 50 V. Gen. Elec.
6—1500 A., 50 V. Century
1—1000 A., 60 V. Gen. Elec.

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Patent Abstracts

GEORGE B. HOGABOOM

Consultant, New Britain, Conn.

Copies of patents may be obtained by writing to Commissioner of Patents, Washington 25, D.C. Price 25 cents each.

No. 2,527,232, October 24, 1950—Bluing Metals—Wright G. Scroxton.

The invention relates to the art of coloring metals and more particularly to the production of a blue color on ferrous metals, such as those commonly used in making gun barrels.

One solution . . . which I prefer for this purpose is as follows:

	Per cent
Distilled water	94.21
Sulfuric acid	1.01
Copper chloride	0.93
Selenious acid	3.70
Wetting agent (Aerosol OS)	0.14
Coloring blue	0.01
	100.00

In the preparation of my new bluing solution I take (1) five gallon distilled water, (2) add wetting agent, (3) sulfuric acid, (4) copper chloride, (5) selenious acid in powder form, (6) bluing color optional. After drying, a thin coat of oil is applied.

CLAIM 2. A composition of matter for bluing of a ferrous article, such as a gun barrel, composed of a dilute aqueous solution containing one per cent each of sulfuric acid and copper chloride, about four per cent of selenious acid, and the remainder water.

2 claims.

References cited: U. S. Patents 2,303,350; 2,348,693; 2,408,116.

No. 2,536,912, January 2, 1951—Electrolysis Etching Device—Lawrence B. Corbett, assignor to International Business Machine Corporation.

CLAIM. In a device for etching a printing roller by

2-ALMCO TUMBLING BARRELS
under 200 hrs. use

Two compartment barrels, each compartment 30" x 30", ¼" neoprene lined. 220 Volts, 3 Phase, 60 Cycles. Infinite variable speeds 6-30 RPM with positive magnetic brake. Reversing Switch, safety switches and timers.

ACCESSORIES

Include 2 HP-1 Hoist Pans, 2 HOP-1 Hopper Units and 1 SU-1 Electric Screening Unit which fits DB-800 Machine. 220 Volts, 3 Phase, 60 Cycles. 2 DO-1 perforated doors and 6 screens No. 1 to No. 6. One Overhead traveling monorail HU-1 Hoisting unit 1000-lb. Cap.

ENTIRE LOT TO BE SOLD AS UNIT. F.O.B. READING, PA. ADDRESS ALL REPLIES TO P. O. BOX 196, READING, PA.

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Complete chromium plating unit. Tanks in all sizes.

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12"—13" Diameter

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Effectively cleanses your zinc solution of copper, cadmium, lead, tin, mercury, and like contaminations as fast as they get into your electrolyte either from the anodes, work, or external sources.
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No filtering required. No waiting period. Economical.
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PROCESS PAT. PEND.
THIS NEW PROCESS IS APPLICABLE FOR FLASH DEPOSITS OR HEAVY GOLD PLATE. IT PRODUCES A HARD RESISTANT GOLD ALLOY THAT WILL OUTWEAR CONVENTIONAL GOLD PLATE OF COMPARABLE GOLD CONTENT.

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electrolysis a tank for holding a liquid solution of electrolyte, a vertical arbor for holding said printing roller in said tank, an electrical contact to said arbor for connecting said roller to the positive terminal of the electrolysis-current source, a cylindrical cathode mounted in said tank concentric with and outside of said roller, means for rotating said cathode, means for rotating said arbor, a series of vanes on said cathode for agitating the solution, a perforated air box placed in said tank under said roller, and an air pump therefor.

1 claim, 1 drawing.

References cited: U. S. Patents 386,073; 684,672; 875,784; 917,795; 944,650; 1,047,995; 1,191,386; 1,312,-756; 1,353,194; 1,414,059; 1,466,994; 1,782,614; 1,959,-376; 2,074,221; 2,110,487.

No. 2,538,317, January 16, 1951—Treatment of Aluminum Sheets—J. F. Mason and F. H. Hesch, assignors to Reynolds Metals Company.

CLAIM 1. In the formation of anodic coatings on sheet aluminum, the improvement which comprises continuously rolling two superimposed sheets of aluminum to reduce the thickness thereof and form on each sheet a gloss fi ish on the sides which contact the rolls and a matte finish on the sides which contact each other, then sealing the edges of the two contacting sheets by applying cement thereto, and then passing the sheets through an anodizing treatment to form on the gloss surfaces an anodic film, and then separating the two sheets each of which has an anodic coating and a matte surface.

CLAIM 2. . . . then passing the sheets through an anodizing and coloring treatment to form on the exterior gloss surfaces a colored anodic coating, and then separating the two sheets each of which has an anodic colored coating and a matte surface.

2 claims, 2 figures.

References cited: U. S. Patents 632,879; 917,285; 1,794,973; 1,819,130; 1,946,148; 2,018,383; 2,098,774; 2,150,395; 2,150,409; 2,214,876; 2,232,019; 2,237,483; 2,324,106; 2,349,083; 2,358,104; 2,435,872; German Patent 688,156. Taylor, "Anodized Aluminum", Metal Ind. *65*, 290–293 (November 10, 1944).

No. 2,538,417, January 16, 1951—Indium Plating—D. T. Green and J. E. Salmon, assignors to Vandervell Products Limited, England.

An example of quantities which have proved satisfactory is as follows:

Indium metal	30 grams
Potassium cyanide	100 grams
Sorbitol	30 grams
Potassium hydroxide	120 grams
Water to make	1 liter

CLAIM 5. A method of making a water-soluble mixture for use in preparing an indium electroplating bath

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a non-foaming cleaner

for 1 . . . use as an electrocleaner (cathodically, anodically) on steel when exceptionally high current densities, tank design or type of work tend to produce excessive foaming.

2 . . . use as a detergent in all types of washing machines for die castings, steel, brass and copper.

Because it is formulated with water conditioners, Cowles SM Cleaner is especially effective under hard water conditions.

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P.S. *the Boss certainly is a smart apple. Buying Green Rectifiers so he could run three shifts a day really paid off. Sit down now and send off a letter and we'll mail you all the information you want about Green Rectifiers, and what they can do for you.*

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RECTIFIER G ENGINEERS

according to which 30 grams of indium as indium trichloride is added to a solution containing approximately 100 grams of potassium cyanide and 30 grams of sorbitol and approximately 120 grams of potassium hydroxide, in which the indium solution is added to a mixture of the sorbitol and cyanide accompanied by agitation and subsequently the hydroxide is added and the solution is evaporated to dryness to leave a residue soluble in water.

6 claims.

References cited: U. S. Patents 694,658; 1,849,293; 1,965,251; 2,423,624; 2,458,839. British Patent 573,848. Iron Age *146*, 35–38 (December 19, 1940). Trans. Electrochem. Soc. *65*, 377–383 (1934).

No. 2,538,831, January 23, 1951—Coloring of Magnesium and Alloys Thereof—Paul R. Cutler, assignor to Consolidated Vultee Aircraft Corporation.

Panels made of magnesium and magnesium-base alloys were first subjected to an anodic oxidation treatment. For this an electrolyte was used consisting of an aqueous solution of a caustic base and a soluble silicate to which was added an organic compound. The composition of this bath may vary as follows:

	By weight
Sodium hydroxide	23 to 25%
Phenol	0.2 to 0.3%
Sodium silicates (waterglass)	2.5 to 3.5%

The temperature of the electrolyte was maintained at 180° F with the magnesium articles serving as the anode, direct current of a density of 15 amperes per sq.ft. was passed through the electrolyte for a period of twenty minutes.

The anodic coating formed on articles subjected to treatment as above is corrosion and abrasion resistant and comprises a hard, dense coating of hydrated magnesium oxide.

The anodized panels were then transferred to the mordant bath, an aqueous solution having therein:

	g/l
Aluminum acetate	5
Ammonium acetate	3

This mordant bath was held at a temperature of between 180 and 190° F. After immersion for about one minute the panels were removed, and after a brief pause to allow for drainage and partial drying, they were directly transferred to the dye bath.

The dye bath was comprised of an aqueous solution of 2 per cent anthraquinone Blue BN. The temperature of the bath was 75° C, and the panels were held in this dye bath for about 3 minutes. This resulted in the article being dyed a royal blue.

CLAIM 1. A process of coloring electrolytically produced hydrated-oxide coatings on articles of magnesium and magnesium-base alloys, which comprises

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Burring Compounds
Emery Paste
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Steel Cutters
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your nickel stripping bath by adding
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Cut acid consumption . . . protects base metal . . . reduces pitting and roughening . . . minimizes need for buffing and coloring.
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PLATING GENERATORS Etc.
1—5000 amp., 6 volt, Chandyson generator to a 60 HP., 3 phase, 60 cycle, 220 volt, .8 P.F., 360 RPM., General Electric Synchronous motor.
1—4000 amp., 6 volt, 2000 amp., 12 volt Jantz & Leist interpole generators consisting of 2—2000 amp., machines connected to a 40 HP., 570 RPM. AC motor.
5—2000 amp., 6 volt, Jantz & Leist interpole generators connected to 20 HP., 3 phase, 60 cycle, 570 RPM. type KT-332 Gen. Elec. motors.
1—1200 amp., 35 volt, 575 RPM. Star ball bearing generator with AC motor.
1—1000 amp., 40 volt, 600 RPM. Burke ball bearing generator with AC motor.
2—600 amp., 40 volt, 1800 RPM., type SK126L Westgh. generators with AC motors.
1—300 amp., 25 volt, 1750 RPM., type SK-110L Westgh. generator with AC motor.
6—500 amp. Gen. Elec. Rectifiers, 3 phase, 60 cycle, 220 volts to 6 volts D.C.
1—800 amp., 6 volt, Jantz & Leist to a 10 HP., 685 RPM., 3 phase motor.
1—500 amp. Hansen Van Winkle, 6 volts to a 5 HP., 3 phase General Electric Motor.
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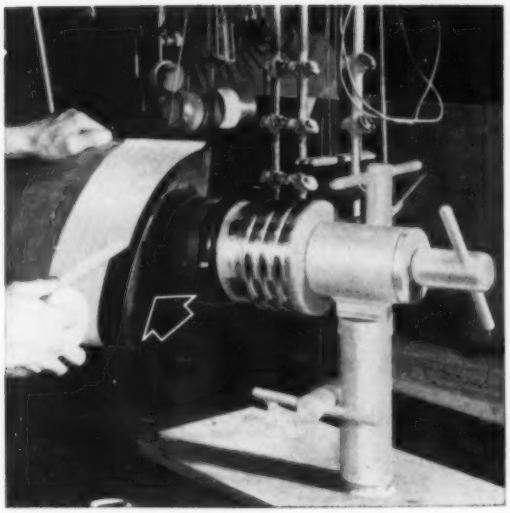

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briefly immersing the electrolytically coated article in a heated mordant bath consisting of an aqueous solution of a water-soluble metallic salt of acetic acid, in a proportion between 1 gram and 6 grams per liter, and a stabilizing agent, in a proportion between 1 gram and about 4 grams per liter, for preventing the decomposition of said water-soluble metallic salt of acetic acid, removing the article from the mordant bath, permitting it to dry partially, and next immersing the article in an aqueous solution of a lake-forming dye.

21 claims.

References cited: U. S. Patents 2,071,156; 2,150,395; 2,310,487; 2,364,964; 2,391,522; 2,497,036. Swiss Patent 198,726. Cutter, Monthly Rev. Am. Electroplaters' Soc. *31*, 709 (July, 1946).

No. 2,538,991, January 23, 1951—Process for Producing Brittle Iron Plate—H. V. Trask, assignor to Buel Metals Company, St. Paul, Minn.

CLAIM 2. The process for making brittle, porous iron plate by electrodeposition which comprises immersing a multiplicity of relatively pure iron plate electrodes in spaced relation one to another in an electrolyte composed substantially entirely of an aqueous solution of ferrous chloride, passing direct current through the electrodes and solution in series while maintaining the concentration of the solution within the range of 50 to 87 grams of iron per liter, the *p*H thereof within the range of 3 to 5.5, the temperature thereof within the range of 15 to 40° C, and the current density within the range of 10 to 40 amperes per square foot, the values within said ranges being selected to produce a brittle, dull-gray deposit having specific gravity from 6.3 to 7.25, and continuing the electrolysis until the several electrodes have been dissolved and redeposited as separate bodies of porous iron.

3 claims, 3 figures.

References cited: U. S. Patents 377,487; 1,456,615; 1,912,430; 1,945,107; 1,996,342; 2,216,167; 2,464,168; 2,464,889. Chem. Met. Eng. *26*, 639, 640, 641 (1922). Trans. Electrochem. Soc. *84*, 319–334 (1943).

No. 2,539,455, January 30, 1951—Electrolytic Polishing of Metals—J. Mazia.

In the present invention the work or metal is made the anode in a circuit of direct current electricity, but the work is not required to be immersed or submerged in the electrolyte as in the "tank" method of electrolytic polishing, nor is the "bath" of electrolyte employed within the ordinary meaning of that term. According to the present invention, a thin layer of an electrolyte suitable for use in electrolytic polishing is applied in any suitable way to the metal object or area of metal surface to be polished, and a direct current of electricity is passed from the metal object through the thin layer of electrolyte to an electrode in electrical contact with the said thin layer of electrolyte but out of electrical contact with the metal object

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Patent Abstracts

or area of the metal surface. The current path from the anode, the work or metal to be polished, to the cathode is, therefore, very short in the present invention. While the electric current is passing across the thin layer of the electrolyte . . . the work and the cathode are moved relative to each other, so that during said relative motion the said thin layer of electrolyte is present between the metal being polished and the cathode.

A suitable electrolyte for electrolytic polishing of copper, 90/10 gilding metal, 70/30 brass, and 60/40 brass is composed of 95 per cent by volume of orthophosphoric acid (H_3PO_4) of 1.69 specific gravity and 5 per cent by volume of sulfuric acid of 1.84 specific gravity. With this electrolyte, and glass wool or glass cloth as the facing or envelope of the cathode, good polishing effects were obtained with a voltage of 8 to 12 volts across the work and the enveloped conducting material of the cathode.

For polishing aluminum . . . two parts by volume of acetic anhydride and two parts by volume of perchloric acid of 1.48 specific gravity* . . . at about 15 volts . . .

For polishing stainless steel of 18–8 type . . . 80 per cent by volume of 1.69 specific gravity orthophosphoric acid and 20 per cent by volume of 1.84 specific gravity sulfuric acid . . . at about 8 volts.

Plain carbon steel . . . electrolyte a mixture of 80 per cent by volume of acetic acid and 20 per cent by volume of an aqueous solution of perchloric acid of 1.48 specific gravity.*

. . . current densities of the order of 1000 to 1500 amperes per square foot of anode surface are attainable.

. . . temperature does not require regulation or control for successful polishing.

CLAIM 5. In the art of electrolytic polishing of a metal wherein the metal to be polished is subjected to the combined action of an electrolytic polishing electrolyte and direct electric current, with the said metal as anode, the process which comprises establishing a layer of electrolytic polishing electrolyte between said metal, as anode, and a cathode spaced from said metal at a distance of from about 0.003 inch to about 0.25 inch, said layer on one side making electrical contact with said metal and on opposite side making contact with said cathode; preventing direct electrical contact between said anode and said cathode by interposing between and in contact with opposed surfaces of them a liquid-retentive, electrically nonconductive material which permits the conduction of electricity between said anode and cathode by said electrolyte; passing direct electric current through said electrolyte from said metal, as anode, to said cathode; and during the passage of said current moving said metal and cathode

*This electrolyte may be explosive.—G. B. H.

Practical Methods for Determining Impurities in Nickel Plating Baths

SILICA can be easily determined by either gravimetric or colorimetric methods.

Colorimetrically, soluble silica is determined by measuring the amount of incident light absorbed by yellow silico-molybdate complex – the reaction product of ammonium molybdate and silicic acid.

The gravimetric method requires that silica be dehydrated with perchloric acid, filtered, ignited and weighed. After being volatilized with hydrofluoric acid and reweighed, difference in weight shows the true amount.

SODIUM and POTASSIUM are revealed by using flame photometry. The diluted bath sample is atomized in the flame photometer. Intensity of the characteristic light of either sodium or potassium is measured with respect to a standard. Concentration of the ion in the diluted sample is read off a calibration curve.

CADMIUM can be determined after copper and iron are removed by precipitation with cupferron and extraction with amyl acetate. Cadmium is precipitated with 2-mercaptobenzothiazole in an ammoniacal solution and extracted with chloroform. Then it is returned to an aqueous medium by shaking the extract with hydrochloric acid. The solution is made strongly alkaline with sodium hydroxide solution and the cadmium is extracted with a carbon tetrachloride solution of dithizone. After dilution, the extinction of the colored system is measured.

ALUMINUM may be determined colorimetrically after removing interfering metals. Color of the aluminon lake is developed by adding aluminon and a buffer to adjust pH to 5.5 and transmittancy of the lake is measured with a colorimeter.

AMMONIUM is separated from the bath by alkali treatment and steam distillation with a micro Kjeldahl apparatus. The ammonia is treated with Nessler's reagent, and the color developed is measured photometrically.

CHROMIUM: To determine chromate chromium, any reducing agents are oxidized with nitric acid. Diphenylcarbazide is added, the transmittancy of the solution is measured, and the amount of CrO_3 present as chromate read off a calibration curve.

For total chromium, any iron, organic compounds, reducing agents, and chlorides are removed, after which the chromium is oxidized with ammonium persulfate. Transmittancy of the solution is measured and the amount of CrO_3 read off a calibration curve.

ZINC is determined colorimetrically. Copper and iron are first removed; then heavy metal impurities including nickel are complexed with sodium di(B-hydroxyethyl)dithiocarbomate. Zinc dithizonate is formed in the presence of these complexes, when a carbon tetrachloride solution of dithizone is added. After removal of excess dithizone, zinc is determined colorimetrically.

CALCIUM is determined by precipitating the heavy metals as hydroxides, and then separating the calcium from the filtrate by precipitating it as the oxalate at a controlled pH. The calcium oxalate is converted to oxalic acid, and the acid is allowed to reduce a known amount of potassium permanganate. Transmittancy of the residual potassium permanganate solution is then measured.

A.E.S. RESEARCH PROGRAM

The American Electroplaters' Society is conducting a comprehensive research program and has developed useful information on current plating problems. International Nickel, in addition to its other support of this program, feels that it will be a further service to make copies of these A.E.S. Research Reports available.

For an authoritative, detailed, 84-page study of this subject, we offer you a free copy of the A.E.S. Research Report, Serial No. 6, entitled *"Determination of Impurities in Electroplating Solutions."* Use the coupon now.

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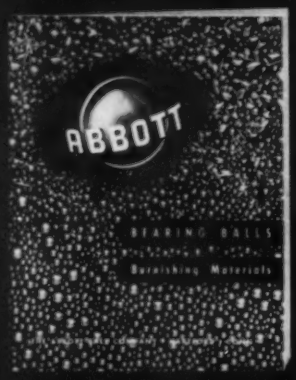

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Patent Abstracts

relatively to each other in a direction transverse to the distance between said metal and the cathode.

5 claims, 6 figures.

References cited: U. S. Patents 1,721,949; 2,244,620; 2,330,562; 2,378,002. British Patent 290,704. Swedish Patent 102,203. Metal Progress **30**, 755, 756 (December, 1939); **36**, 209–212 (August, 1942); **31**, 55–57 (January, 1940); Can. Chem. Process Inds. **24**, 367–369 (July, 1940); Metal Ind. **62**, 69–70 (January 29, 1943); Steel **101**, 72, 74 (June 17, 1940).

No. 2,539,502, January 30, 1951—Electroplating Anode and Mount—A. Zanetti and L. C. Testut

CLAIM An electroplating device comprising a carrier having a surface exposed to an axis, a plurality of vitreous insulating anti-friction locating elements extending toward the axis from said surface and terminating at radially equal distances from the axis, some of said pins extending radially and some extending at about 45° angle to the axis, an insulating member on said carrier remote from said surface, a conductive support mounted on said member and insulated from said carrier, said support having spaced portions extending on opposite sides of the axis, and an electrode fastened to said spaced support portions, said electrode being on the opposite side of the axis from said carrier and below the axis, said electrode between said portions having a surface exposed to the axis, the intersection of said electrode surface and a plane normal to the axis forming an arc about the axis as a center of less than 180° and concave toward the axis, the intersection of said electrode surface and a plane including the axis forming an arc concave toward the axis.

1 claim, 5 figures.

References cited: U. S. Patents 1,772,074; 1,861,272; 1,880,382; 1,904,432; 2,072,170; 2,422,242; 2,473,290. British Patent 18,643. French Patent 877,169. Metal Cleaning Finishing **5**, 235–238 (June, 1933).

No. 2,539,588, January 30, 1951—Electrodeposition of Nickel—Paul W. Moy, assignor to Harshaw Chemical Company.

CLAIM 3. In a process for electrodeposition of bright nickel the step affecting electrodeposition from an aqueous, acid solution comprising nickel sulfate, nickel chloride and cooperating addition agents effective to cause deposition in bright and ductile state, one of said addition agents being a thianaphthene compound of the class consisting of thianaphthene 1-dioxide, monochlorothianaphthene 1-dioxides, dichlorothianaphthene 1-dioxide and 3-thianaphthene 1-dioxide, the same being maintained in said solution in concentration from 0.35 to 1.0 gram per liter, and the other of said addition agents being an aromatic sulfonate of the class consisting of benzene disulfonates, acetophenone

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PR employs the principle of periods of current reversal during a conventional plating operation. Wes-X is an addition agent of inorganic, metallic compounds, including cyanides. Its use completely eliminates organic additions to the bath. The bath is outstanding in its ease of control. All constituents can be accurately analyzed. The metal and chemical content is not critical, permitting a wide latitude in operation.

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sulfonates, thianaphthene dioxide sulfonates and saccharine, maintained in solution in concentration from 0.5 to 1.5 grams per liter, said thianaphthene dioxide sulfonates having the sulfonate group attached directly to a carbon atom on the heterocyclic portions of the thianaphthene nucleus.

12 claims.

References cited: U. S. Patents 2,326,999; 2,469,727.

No. 2,539,681, January 30, 1951—Process for the Electrodeposition of Zinc—R. P. Yeck and Y. E. Lebedeff, assignors to American Smelting & Refining Company.

CLAIM 1. In the art of electrodepositing zinc from an acid electrolyte, the major nonaqueous constituents of which are substantial quantities of sulfuric acid and zinc sulfate, using insoluble anodes of which at least the major portion is lead, that improvement for enhancing the purity of the zinc cathode deposit which consists of adding strontium to the electrolyte in amount insufficient markedly to affect the acidity of the latter but sufficient to lessen the amount of lead entering into the zinc cathode deposit during electrolysis, and electrodepositing zinc from said electrolyte, thereby obtaining a zinc cathode deposit of lower lead content than would result but for such addition of strontium.

3 claims.

References cited: U. S. Patents 1,163,286; 1,163,911; 1,167,701. British Patent 8,467; 273,682. German Patent 24,682; 26,091.

No. 2,539,898, January 30, 1951—Electrical Contact Mechanism for Plating Machines—J. V. Davis, assignor to The Udylite Corporation.

CLAIM 1. In a plating machine, a frame, a horizontal rail supported thereby and including fixed sections and an intervening movable section, means for elevating said movable section, a conducting strip secured on one side of said movable section, a conducting block carried on the other side of said movable section, an insulating section between said strip and said block, a vertically extending guide plate supported by said frame adjacent to said block in the lower position of said movable section, said plate being insulated from said frame and having its upper end curved away from said movable section, spring means urging said plate toward said block, and means for delivering current to said plate.

8 claims, 15 figures.

References cited: U. S. Patents 1,552,004; 1,577,589; 1,920,774; 2,018,016; 2,129,706; 2,170,285; 2,223,870; 2,412,382; 2,414,301; 2,484,079.

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A. E. S. News

The Boston Amendment

A misunderstanding arose in connection with the Executive Board's vote on the Boston proposal reported in the March issue. Its 4-to-1 vote was in favor of publication in PLATING and not in favor of the amendment.

At a recent Board meeting, the majority of the officers expressed approval of the sense of the Boston amendment, but the Board is giving the matters further study and will communicate with the Branches at a later date.

A. E. S. Publications in Public Library of South Australia

W. Fisher, Hon. Secretary of the Adelaide Branch, recently advised that the Branch has supplied the Public Library of South Australia with files of THE MONTHLY REVIEW or PLATING beginning 1946 and with copies of the *Proceedings* beginning 1947. This was accomplished through the good offices of H. Matters and J. Strugnell, who furnished most of the copies.

Headquarters office has now been able to supply a few missing copies, including 1946 *Proceedings*, and to send, in addition, a complete set of copies of THE MONTHLY REVIEW from 1930 to 1945.

Those who have contributed to the Society's file of back issues should feel proud to know how valuable their assistance has been.

A. E. S. Research Finance Organization Streamlined

To obtain more personal contacts in securing sustaining memberships, the Finance Subcommittee of the Research Committee has added several District Supervisors to its organization.

According to H. V. Struckhoff, Chairman of the Subcommittee, Vice-Chairman Clyde Kelly will be in charge of the Western Section, Vice-Chairman Del Robson of the Eastern Section. They will work with the following District Supervisors:

Eugene L. Combs, Bay Village, Ohio—Cleveland, Cincinnati, Columbus, Dayton and Toledo Branches

W. B. Knight, Detroit, Mich.—Detroit, Saginaw Valley, Grand Rapids and Jackson-Lansing Branches

R. F. Ledford, Chicago, Ill.—Chicago, St. Louis, Los Angeles, San Francisco, Milwaukee, Twin City, Louisville and Rockford Branches

Manson Glover, Malden, Mass.—Boston, Bridgeport, Hartford, Providence-Attleboro, New Haven, Springfield and Waterbury Branches

Clyde Kelly, Chicago, Ill.—St. Joseph Valley, Louisville and Indianapolis Branches

New Sustaining Members

Again we are pleased to report additional sustaining members of the Society, whose dues go to the support of A. E. S. Research. They are:

Accurate Electro-Plating, Inc., Philadelphia, Pa.
Electro Coatings, Inc., Chicago, Ill.
The Howell Company, St. Charles, Ill.
Plating Service Company, Chicago, Ill.
Sunbeam Corporation, Chicago, Ill.

C. E. Heussner's Memory Honored

At the March 16 meeting of the A. E. S. Research Committee, a formal resolution was presented and passed as follows:

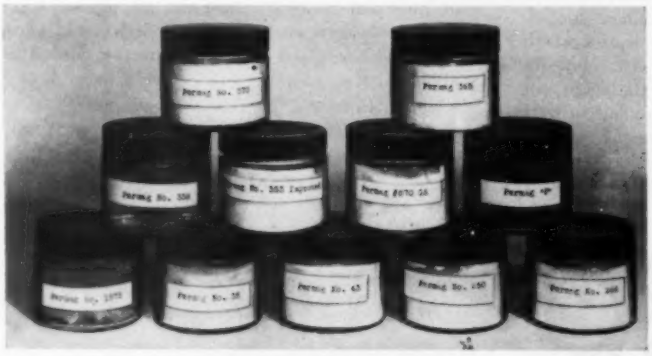
"WHEREAS, through the recent decease of Carl E. Heussner, the American Electroplaters' Society and the electroplating industry have suffered the loss of one who unselfishly devoted his life to advancement of this field of science and industry, and

"WHEREAS Carl E. Heussner generously contributed his time and energy to the organization and operation of the Research Committee, whose activities will serve as a monument to his efforts,

"BE IT RESOLVED that The Research Committee hereby expresses its great appreciation of his services and its sense of loss at his passing, and extends its sincere sympathy to his bereaved family, and

BE IT FURTHER RESOLVED that a copy of this resolution be sent to his widow, Mrs. Helen Heussner".

This action of the Research Committee is but one of many indications of the lasting effect of Heussner's contribution to matters with which he was associated.



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The papers to be presented at the BUFFALO A. E. S. CONVENTION will be most timely and particularly pertinent to the present problems in the METAL FINISHING FIELD.

While the men are busy at the Technical side of the convention, an excellent social program has been planned for the ladies and of course they will join in the social activities planned for the men.

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Thirty-Eighth National A. E. S. Convention
Buffalo, New York • July 30-31, August 1-2, 1951

Washington Orders

(*Continued from page 477*)

ral rubber latex, and total new rubber, including synthetic, except for DO orders. An Appendix A lists a variety of rubber products, including many used by the plating and allied industries, and the special restrictions placed on each. The total amount of new rubber permitted to be used was increased because of greater availability of synthetic rubber.

The amendments dated April 1 and 6 continue the use of Appendix A with its limitations but change the basis for apportionment of new rubber to users. They permit a monthly use of new rubber, except natural latex, in an amount equal to 90 per cent of the average monthly consumption during the year ended June 30, 1950, as adjusted by the NPA, and a monthly use of natural rubber latex in an amount equal to one-fourth of the users' base monthly consumption. They restrict in various ways the manufacture of rubber tires and tubes for passenger cars to make more tires available for trucks, tractors and farm equipment.

Teflon.—Polytetrafluorethylene primary plastic is now subject to allocation as an Appendix A material under Schedule 2 to M-45, April 6. The entire production is devoted to the defense program.

Tin.—Order M-8, as amended on March 12, puts all large users, who receive a total of 5 long tons or more per month, on allocation by the NPA beginning May 1. The smaller user shall furnish the supplier a certificate to the effect that the tin is to be used for a stated permitted use.

The order also increases the permitted quantity of pig tin for manufacture of tin plate and terne plate during April, May and June, 1951, to 95 per cent of the user's average monthly use during the base period. This increase is made primarily to supply plate for the canning industry's spring and summer food packs. All importation of tin has now been put in the hands of the RFC.

The can order, M-25, was amended on March 16 to exempt the Armed Forces from restrictions pertaining to canning of products for overseas use. A Direction 1 to this order, dated March 12, makes certain adjustments in the base period.

Another amendment of Order M-8, dated April 2, permits suppliers of tin and tin products to acquire a normal resale inventory by anticipating receipt of buyers' end-use certificates.

Order M-24, Tin Plate and Terne Plate, was amended on April 3 to extend the permitted use of terne plate and to restrict the use of recoated defective electrolytic tin plate to permitted hot-dip tin-plate applications.

An amendment of April 6 to M-25, Cans, changes the tin-can quota for several items and provides other changes.

Branch News

BOSTON BRANCH

The Branch met on February 1 in Hotel Statler with PRESIDENT CHESWORTH in the chair.

M. GLOVER, L. V. GAGNON and DR. G. P. SWIFT were elected Delegates, with J. T. SULLIVAN, A. W. GARRETT and L. A. CHESWORTH alternates. The subject of A. E. S. finances was discussed thoroughly, and an amendment to the Constitution and By-Laws thrashed out, voted on, and submitted to the National Office.

LIBRARIAN NARCUS presented DR. F. A. LOWENHEIM of Metal & Thermit Corporation, who discussed "Alkaline Tin Plating", covering both the potassium and the sodium baths and the relationships of temperature, current density and speed in each. The substitute zinc-tin bath was also discussed, but no hopes were held forth that it would be available for general unrestricted use. A lengthy discussion period followed the excellent presentation.

GEORGE P. SWIFT, *Secretary*

BOSTON BRANCH

At the meeting on March 1, the Annual Meeting program was announced as under sail and moving fast under the guidance of MANSON GLOVER. JOE SULLIVAN is General Chairman, ANNE BAKER LOVE, Ladies' Chairman, and SENATOR FURBUSH, Entertainment Chairman. Unfortunately, the Senator cannot promise a Kefauver hearing, but has put forth a budget-watching proposal.

LIBRARIAN NARCUS presented MR. KEN BELLINGER of The Chemical Corporation, Springfield, Mass. His subject, "Conversion Coatings", was treated informally but to the point. Beginning with the basic cycle for zinc plating on both steel and diecastings, in still tank and barrel installations, he followed with a general and full description of current practices, describing the various dips and showing samples to illustrate the results. A brief discussion period followed the excellent talk.

GEORGE P. SWIFT, *Secretary*

BRIDGEPORT BRANCH

The Old Timers' Night at the Harry W. Congdon Post No. 11, American Legion Hall, on February 9 had an attendance of 62 members and guests, the latter including B. J. GAFFNEY, Secretary-Treasurer of the New Haven Branch, WALTER LYNCH, JACK BARRY and JACK ENGLISH.

CHAIRMAN W. A. EHRENCRONA dispensed with the business meeting. Every one enjoyed the famous "Smorgasbord" and refreshments. GEORGE MORROW, a member of the Branch, presented feats of magic which completely baffled the audience.

Stories, poems and anecdotes by members and card games made the evening very pleasant.

JOSEPH G. STERLING,
Secretary-Treasurer

BUFFALO BRANCH

SECRETARY JOE CUERDON has resigned because of pressure of other duties, and the Board of Managers drafted H. A. FUDEMAN back into harness to finish his term.

At the meeting on March 11, GENERAL CHAIRMAN BERT KIRCHOFF gave the first official committee report on the 1951 A. E. S. Convention to be held in Buffalo between July 30 and August 2. The Branch is ready to greet a record crowd. Reservations are pouring in. Reservation blank should be returned immediately to Ben Fortin, 200 Forest Drive, Orchard Park, N. Y.

Our old friend, HAROLD FAINT, of Industrial Filter & Pump Manufacturing Company, gave tips on "Filtration". The talk covered many phases of the subject, from filter aids and pump design to the gunk that is left at the end. A lively discussion period followed, which continued into the small hours.

H. A. FUDEMAN, *Secretary*

CHICAGO BRANCH

On March 9, 50 members attended the dinner and 105 members and guests the regular meeting which followed.

Speaker for the evening was MR. EZRA BLOUNT, Editor of Products Finishing, and his subject was "Preparation of Metal Surfaces for Organic Finishing". Mr. Blount's very informative talk outlined numerous methods and their comparative value for preparation of magnesium, aluminum, zinc and steel prior to organic finishing. Many questions followed from the floor, particularly from those members who are primarily interested in organic finishing and who made it a point to attend this meeting.

The annual election of officers gave the following result:

President—R. F. LEDFORD
First Vice-President—CLEM PETROSIUS
Second Vice-President—ELMER OLSON
Librarian—J. M. ANDRUS
Secretary-Treasurer—PAUL GLAB
Board of Managers—DR. J. H. MONAWECK, *Chairman*, RUDY HAZUCHA, HAROLD FAINT
Delegates—CLYDE KELLY, PAUL GLAB, J. M. ANDRUS
Alternates—H. A. GILBERTSON, CLEM PETROSIUS, MARION LONGFIELD

R.F. LEDFORD, *President*

CINCINNATI BRANCH

On March 28, some 36 members and guests were present at dinner and additional members turned up at the meeting, which featured a very active business session, topped off by the annual election.

PRESIDENT EZRA A. BLOUNT thanked STEWART CHIPMAN for plating several

pieces of kitchen equipment in the Engineering Society's dining room. After a spirited discussion the Delegates were instructed to vote against the Boston Amendment.

PRESIDENT BLOUNT appointed CARL CLAYBAUGH, CHARLES T. NUZUM and CHARLES WISE Delegates, C. WALTER PARKE, E. A. BLOUNT and R. D. MILLER, alternates.

The election of officers for the ensuing year had the following result:

President—R. D. MILLER
Vice-President—CARL C. CLAYBAUGH
Librarian—CARL TRUMAN
Assistant Librarian—HAROLD SMITH
Secretary—CHARLES WISE
Treasurer—CHARLES T. NUZUM
Board of Managers—STEWART CHIPMAN

PRESIDENT BLOUNT then thanked the officers and members for their cooperation during his year as head of the Branch and turned the meeting over to the new President. The Branch then thanked MR. BLOUNT for his outstanding stewardship.

PRESIDENT MILLER introduced the speaker, MR. R. VANDEN BERG, Manager of the Finishing Section of the Process Laboratory, Aluminum Co. of America. He opened his talk with a movie entitled, "Date Line Tomorrow". An anodic treatment was recommended to prevent aluminum alloys from corroding, whereas electroplating was thought excellent for appearance or surface hardness and to obtain certain functional characteristics. He then discussed various etching solutions, using slides to bring home his points.

After the usual question period, the members and guests adjourned for the social hour, which was sponsored by Pennsylvania Salt Manufacturing Co.

CHARLES WISE, *Secretary*

DAYTON BRANCH

The Sixth Annual Educational Session and Dinner Dance was held on March 3 in Hotel Biltmore. As usual, the weather was bad for this occasion and spoiled the attendance at the Educational Session, but the 62 members and friends that came enjoyed a very profitable afternoon.

A. E. S. PRESIDENT WILLIAM J. NEILL was Honorary Chairman and introduced the speakers: MR. S. M. MARTIN, of United Chromium, Inc., who discussed "The Engineering Aspects of Plating Room Layout"; MR. R. F. LEDFORD, of Hanson-Van Winkle-Munning Company, who dealt with "The Wear Characteristics of Some Common Electrodeposited Metals"; and DR. CHARLES L. FAUST, of Battelle Memorial Institute, who spoke about "Alloy Plating". The lectures were followed by a question-and-answer period and inspection of samples brought by Dr. Faust.

The dinner began at 6:30 and was followed by the distribution of favors to the ladies, who can thank BOB RULEFF for doing the difficult job of picking them out. The floor show, arranged by STEVE PUTZAN, seemed to be enjoyed by all. The dancing continued into the wee hours of the morning.

Thanks go to RALPH CLINEFELTER, General Chairman, his committee chairmen, and the sponsors and suppliers without whose aid the party would not have been a success. This affair gets bigger and better every year. Just ask why of the 476 people that were present.

R. M. CLINEHENS, *Secretary*

DETROIT BRANCH

The March meeting of the Detroit Branch was held in the Statler Hotel on the 2nd. About 185 members were in attendance.

PRESIDENT E. A. HAHN introduced the feature speaker, DR. FREDERIC A. LOWENHEIM, Research Chemist with Metal & Thermit Corporation, Rahway, N. J. His subject, "Tin-Zinc Alloy Plating", was of particular interest to the group in view of the current shortage of cadmium. Dr. Lowenheim, widely recognized as an authority on this field of plating, gave a most informative talk.

The Branch Executive Board held its usual dinner meeting preceding the session. Arrangements for the 1951 Stag Day were reported by CHAIRMAN F. WAGNER as progressing satisfactorily. This annual affair has become one of the major social activities of the Detroit Branch and is keenly enjoyed and awaited.

E. A. STEEGAR, *Publicity Chairman*

HARTFORD BRANCH

Approximately 75 members and guests attended the regular monthly meeting on March 19. Preceding the meeting a colored movie, "The Curiosity Shop", was shown through the courtesy of the Aluminum Company of America.

The speaker was MR. I. L. NEWELL, of of the Henry Souther Engineering Company, whose subject was "Conversion Coatings on Metals". Conversion coatings should be continuous (free from pinholes), insoluble in the surrounding media, and abrasion resistant, and they should furnish a good base for paint adhesion, be oil absorbent to protect against rust, and have a pleasing appearance. Most coatings are formed through an oxidation process, with or without the use of current. The following processes were discussed and samples of each coating were shown: *On aluminum*—chromic acid anodizing for corrosion resistance (coatings may be dyed and sealed); sulfuric acid anodizing for alloys with over 5 per cent copper; chemical dips, such as Alrok and Alzak, and phosphate dips for paint adhesion. *On magnesium*—anodic treatment with dichromates or Manodyzing (coatings can be dyed and sealed); chrome-pickle dips for paint adhesion. *On zinc*—black or yellow treatments, such as Anozinc, Cronak, Luster-On, Iridite, Pro Seal, for corrosion resistance and paint adhesion. *On copper*—anodic treatments in alkaline solutions for a hard, corrosion resistant film, such as Dura-Black and Ebonol C. *On steel*—treatments in strong oxidizing alkaline baths such as Ebonol S and Black Max, to form a black oil-absorbent film. Phosphate treatment in acid solutions for corrosion protection and paint base, such as Parkerizing and Bonderizing, were also discussed.

HARRY SANDERS was the technical chairman for the evening, and refreshments were served through the courtesy of the Apley Austin Company.

STANLEY PLATOZ, *Secretary*

HOUSTON BRANCH

This new Branch held its organization meeting on February 16, at which time permanent officers were elected as follows:

President—HERBERT L. WIGGS, JR., Southwestern Plating Company
Vice-President—E. W. FERGUSON, Houston Retinning & Plating Co.
Secretary-Treasurer—J. R. BYERLEY, Dixie Electro-Plating Company
Librarian—PLES KENNERLY, Antique Plating Company
Board of Managers—JAMES WEAVER, Weaver Equipment & Supply Company; CHARLES MATTIZA, Harshaw Chemical Company; ED WHITMORE, Beaumont Plating Works.

As of this meeting the Branch has 28 members, 8 of whom transferred from other Branches or are former members-at-large. In a very short time it expects to have a roll of nearly 50 members.

The first meeting was an enjoyable one. The speaker of the evening, MR. WILLIAM WISDOM of Kelley Field, presented an interesting and informative talk about "Porous Chromium Plating on Internal Combustion Engine Cylinders". The members were interested in the samples of porous chromium which Mr. Wisdom had brought and in a portion of electrodeposited chromium which was in excess of ¼-inch thick.

J. R. BYERLEY, *Secretary-Treasurer*

LANCASTER BRANCH

On March 9, 25 members and guests enjoyed an Amish dinner at the home of ISAAC HUYARD. The dinner, served in family style in the living room by Mr. Huyard and his family, was typically Pennsylvania Dutch and consisted of home-cured ham, fresh country sausage, four vegetables, several "sweets" and several "sours". After everyone had his fill, the group adjourned to the Stevens Trade School in Lancaster for the regular meeting.

The routine business consisted of electing one applicant to membership, reports of the Nominating and By-Laws Committees, appointment of Delegates and alternates to the Convention.

LIBRARIAN RAY VINES introduced MR. DEL ROBSON, Eastern Representative of the Finance Sub-Committee of the A. E. S. Research Committee. He reported that

at the present time there are approximately 230 sustaining members of the Society, who contribute nearly $30,000 to the Research Program.

Mr. Vines then introduced Mr. Clarence Boerckel, Sales Representative of the Reynolds Robson Supply Company, Philadelphia, who spoke about "Automatic Plating Equipment". The equipment was divided into the continuous type used in wire-cloth and strip plating, and the batch type, of which there are two kinds, for barrel plating and rack plating. The advantages of each type in particular kinds of plating was explained, and movies were shown of several automatic plating installations in operation.

Harry A. Saylor,
Secretary-Treasurer

LOS ANGELES BRANCH

The February dinner meeting was held on February 14 with 54 members and three visitors present.

The Branch welcomed six new members. The members received the news about the cancellation of the Los Angeles Convention with much regret, as they had put in a great deal of work and had plans laid for a very interesting and entertaining convention. It was decided to hold the Annual Educational Session and Dinner Dance on April 21. These annual sessions have proven to be quite popular, and each year a larger attendance is reached. Don Bedwell, Jack Beall, and Dick Wooley were elected Delegates to the Buffalo Convention.

The speaker of the evening was Mr. Stuart Krentel, of Spence Electroplating Company. He spoke about "Anodizing of Aluminum", and explained the flow cycle for the two common processes: the chromic acid and the sulfuric acid process. Operating conditions, equipment required, film produced, dyeing, racking, voltage requirements, corrosion resistance, and many other aspects of the field were covered. Mr. Krentel, who is well known throughout the mid-west, has made an enviable reputation in the short time he has been on the West Coast. He has presented other talks to the Branch, and he speaks with a complete understanding of his subjects.

George McDonald *Secretary*

LOS ANGELES BRANCH

The March meeting, on the 14th, was election night and a slate of dynamic officers was elected for the coming year:

President—Roy Lostutter
First Vice-President—Myron Orbaugh
Second Vice-President—Elmer Richardson
Secretary—Stuart Krentel
Treasurer—Peter Rogers
Librarian—Earl Arnold
Board of Managers—Dick Wooley, Walter Behlendorf, Ernest Fest

The speaker for the evening was Mr. D. N. Eldred, who spoke interestingly about "Zinc Plating". Mr. Eldred is well known on the West Coast for his analytical service to the plating trade. His talk covered the equipment and location of tanks in the zinc plating line, bath makeup, filtration, anodes, addition agents, throwing power, control, and many other aspects. He passed around samples of zinc plated articles.

George McDonald, *Secretary*

LOUISVILLE BRANCH

Election of officers was held at the regular meeting on March 15, with the following result:

President—Thomas K. Allison
First Vice-President—S. J. Beyer
Second Vice-President—H. D. Jones
Secretary-Treasurer—J. W. Scholl
Librarian—H. Pate
Board of Managers—T. K. Allison, J. W. Scholl, H. Pate

President Albert Steidle then introduced Mr. H. E. Head, of the Briggs Manufacturing Company, Detroit, who read his interesting paper, "The Plating of Stainless Steels". He explained that stainless steel with only a chromium coating was being used by certain manufacturers in an effort to produce a better, longer-wearing product, regardless of the high price of stainless steel. He also discussed the use of copper-core lead anodes by his company, their faults and merits.

G. H. Hillebrand, *Secretary*

MELBOURNE BRANCH

Thirty-three members and visitors attended the 58th regular meeting on March 15.

Committeeman John Dale introduced the speaker, Mr. C. J. Cocks of Perth, who spoke on "The Future of Electroplating". Solutions are constantly being improved to increase throwing power and efficiency, and new types of solutions can be expected. Sequestering agents for use in plating baths may be developed, so that harmful impurities can be kept in solution, and catalysts may be found to enable the plating of metals which at present cannot be deposited commercially. The greatest field for future advancement should be alloy plating. Mr. Cocks related some of his experiences with brass, tin-zinc, and speculum before dealing more generally with the possibilities of tin-nickel, nickel-phosphorous, copper-germanium, and iron-chromium. The general introduction of automatic controls can be expected to reduce greatly the human factor in plating.

A lengthy discussion period, to which most of those present contributed, covered metal spraying, current metal shortages, specification plating, competition from plastics, and bright vs matte finishes.

Rowland H. Keller,
Honorary Secretary

MILWAUKEE BRANCH

Everyone had a wonderful time at the February meeting, thanks to Glen Schwemer, Vincent Mattacotti and the members of the Wisconsin Job Platers Association who provided the excellent buffet supper and entertainment. Thanks also go to Wally Kessler and the Pabst Brewing Company for inviting us to the beautiful Blue Ribbon Hall, where we enjoyed the amber fluid that induces "Gemuetlichkeit".

The guest speaker, Mr. Frank K. Savage, President of the Savage-Rowe Plating Company, Kalamazoo, Mich., addressed the 120 members and guests who ventured to attend the meeting in spite of the sudden blizzard. His excellent discussion of the plating of "Precious Metals and Alloys" covered such fundamentals as the electromotive series and the ionization constant. Mr. Savage explained the common ion effect, which is so useful in depressing the activity of silver in strike solutions, thus preventing its deposition by immersion. Electroforming and plating of band instruments were discussed, with excellent suggestions for the recovery of precious metals from rinse tanks. The question period brought out an explanation of deposition potentials in alloy plating and the role that cyanide plays in bringing these potentials together.

E. E. Piellusch, *Secretary-Treasurer*

NEWARK BRANCH

About 45 members and guests were present at the meeting on February 16. Horace Smith has been hospitalized, and all of us wish him a speedy recovery.

During the business session, John De Vries was added to the Board of Managers. The nominating committee appointed by President Myron Diggin will consist of: John DeVries, Chairman; H. Linford, and J. Gumm.

An Exhibit Committee for the Buffalo Convention was appointed by the President, consisting of: A. P. Munning, Chairman, Dr. D. G. Foulke, S. Frey, and J. Gumm.

One application for membership was accepted. The sum of $25.00 was donated to the American Red Cross.

Two movie shorts were shown, one on swimming and the other showing scenes around the National Capitol.

Librarian Robert Horrocks introduced the speakers and acted as moderator of the discussion that followed. Dr. F. A. Lowenheim, of the Metal & Thermit Corporation, spoke about the development of the zinc-tin alloy plating bath and some of the interesting characteristics of the deposits. Mr. S. Fabry, of the Belke Manufacturing Company, read a paper on the subject of rack coatings. A very attractive booklet on plating racks was given each person. It answers such questions as "How to cut costs by improved racking"?, "How to design efficient racks"?,

"How to make racks that stand up"?, "How to rack difficult shapes"? and "How to rack small parts"? Samples of various types of racks and coatings were passed out to the audience for their inspection.

SAMUEL S. FREY, *Recording Secretary*

NEW HAVEN BRANCH

The Branch held its first "Christmas Ladies' Night" on December 12, in Long Hill Inn, Wallingford.

During the cocktail hour, DR. H. L. KELLNER presented a film entitled "Making and Finishing of Costume Jewelry", which gave the ladies present a deeper understanding of their precious accessories. A delicious roast beef dinner was followed by the highlight of the evening, "The Yale Mad Hatters" giving their inimitable renditions of songs and ballads. Dancing climaxed one of the best parties ever held. Those who attended are looking forward to another "Ladies' Night" next year.

B. J. GAFFNEY, *Secretary-Treasurer*

NEW HAVEN BRANCH

The New Haven Branch held its fourth introductory course in finishing on January 9 in the Sterling Laboratory, Yale University.

MR. C. F. ROBISON, Engineer of The Harshaw Chemical Company, Cleveland, Ohio, was able to bring to his talk on "Nickel Plating" twenty-five years of experience with this one metal. A recognized authority throughout the industry, he covered general operations, preparation of all types of base metal, plating solutions, purification, analytical and temperature control. It gave the plater present a good opportunity to diagnose his troubles with this precious metal.

B. F. GAFFNEY, *Secretary-Treasurer*

NEW YORK BRANCH

The first meeting of the month on February 9 was a closed business meeting. Five applications for membership were received. Dues were raised by unanimous vote from $10 to $12.50 a year in order that the Branch might keep abreast of increased operating costs. It was also voted, unanimously, to begin the Branch year in January and end it in December, the change to take effect on January 1, 1952. Nominations for officers for the coming year (March 31–December 31) were made; they will be reopened at the next business meeting.

DERICK HARTSHORN introduced MR. BROZIER, President of Roberts Rouge Company, Stratford, Conn., who spoke on a much neglected topic, "Ball Burnishing". A question-and-answer period followed, with Mr. Brozier supplying the answers.

For the second meeting of the month, the Annual Open Meeting, the Branch met in the Panel Room of the Hotel New Yorker at 3 P. M., February 19. The presiding officer was DERICK HARTSHORN.

MR. SIEGFRIED F. BART of the Bart Laboratories, Belleville, N. J., speaking about "Electroforming, Past and Present", described in detail the methods used and emphasized that electroforming solves problems that cannot be solved by casting, etc. During the symposium on "Conversion Coatings" that followed, MR. ALFRED DOUTY, Chief Chemist of American Chemical Paint Company, Ambler, Pa., discussed phosphate coating of zinc, cadmium, and steel and chromate coating of aluminum. DR. WALTER F. MEYER, President of Enthone, Inc., New Haven, Conn., followed with a paper on oxide coatings of metals and chromating of cadmium and zinc. DR. D. GARDNER Foulke, Chief Chemist of Hanson-Van Winkle-Munning Company, Matawan, N. J., covered coating of magnesium with chromate films.

The banquet, in the Grand Ballroom of the Hotel New Yorker began at 7:30 P. M. After the members and their guests had finished a whole-squab-chicken dinner, they were entertained by such seasoned performers as Jack E. Leonard, Terry 'n' Taffy, Dietrich & Diane, Guen Omeron, and Saul Grauman. The party ended with dancing to the smooth rhythm of Charles Peterson and his orchestra.

The Branch is grateful to those members who worked hard to make this one of the most successful annual meetings that the Branch has known: ANGELO AMATORE, General Chairman; ALBERT FUSCO, Co-chairman; JAMES CLIFFORD, Entertainment; IRVING GOLDWASSER and LESTER LEVINSON, Reservations and Service; CHARLES E. SCHLOTT, Ladies' Program; SECRETARY-TREASURER GEORGE SCHORE; Advisor THOMAS TRUMBOUR; and those men who served anonymously on the committees.

GRACE ARONSON,
Recording Secretary

NEW YORK BRANCH

At the meeting on March 9, five applicants were welcomed into membership. There were three new membership applications, and two resignations accepted.

The following were elected to serve during the year 1951–1952:

President—GEORGE F. HERRMANN
First Vice-President—ANGELO AMATORE
Second Vice-President—ALBERT FUSCO
Secretary-Treasurer—GEORGE SCHORE
Financial Secretary—
MARTIN F. MAHER, JR.
Recording Secretary—PETER L. VEIT
Librarian—LIONEL DE WALTOFF
Sergeant-at-Arms—LESTER LEVINSON
Board of Managers—JOHN E. STERLING
PETER L. VEIT, *Recording Secretary*

PHILADELPHIA BRANCH

A joint meeting with the Philadelphia Chapter of the Electrochemical Society was held at the Harrison Laboratory of the University of Pennsylvania on March 7. It was preceded by a dinner at the Lenape Club.

The speaker was DR. CHARLES L. FAUST of the Battelle Memorial Institute, President of the Electrochemical Society, who spoke about "Chemical and Electrochemical Smoothing". With the help of slides, he showed that the hardness of the basis metal and the fineness of the abrasive used had a definite relation to the surface smoothness as measured on the Profilometer. A coarser grit (150) on high-carbon steel gives a lower RMS value than does a finer grit (180) on a low-carbon steel. In discussing the data showing lower readings after mechanical polishing than after electropolishing and electrobuffing, Dr. Faust stated that mechanical polishing deforms the surface by a tearing, smearing action, which distorts the crystal structure in the surface, causing a similar structure to appear in subsequent deposits. He showed how aluminum and iron surfaces were deformed by rubbing with No. 00 grit abrasive.

The smooth surfaces produced by bright electrodeposits, electropolishing, and chemical polishing exhibited a marked similarity to the main mass of material and lacked the surface flow layer produced by mechanical polishing methods. Electropolished surfaces have the same light reflectivity in both transverse and longitudinal directions; mechanical polished surfaces show marked differences between the two directions.

A Branch business meeting followed Dr. Faust's talk. Five new active members were admitted; four applications were received. A motion to donate $100 to the A. E. S. Research Fund was proposed by the Board of Managers and passed. Nominations for Branch officers, Board of Managers, Delegates and Alternates for the 1951–1952 term were made, elections to take place at the March 30 meeting.

I. WM. MARCOVITCH, *Secretary*

PROVIDENCE-ATTLEBORO BRANCH

The regular meeting on February 19 in the Providence Engineering Society Hall was called to order by PRESIDENT RAY MITCHELL with 41 members and guests present.

ARTHUR WOOD, only active charter member, who has served as Librarian and on the Board of Managers, was unanimously voted an honorary membership in the Branch.

MR. ROBERT M. LORD, Grinding Engineer of the Norton Abrasive Company, spoke about "Abrasive Tumbling". In his fine talk he reviewed the methods used over a period of years, what present day methods will give in the way of cut and finish, and gave a full description of correct tumbling, proper use of lubricating and nonlubricating cleaners, and what parts can and cannot be tumbled. He

concluded his talk with a number of slides and a question period. A large display of parts before and after tumbling created a great deal of interest.

A large number of guests from other societies that meet in the Engineering Society Hall was very encouraging.

The Nominating Committee brought in a slate of officer candidates. It will be published in the March notice and voted on at that meeting.

F. W. Boothroyd, *Secretary*

ROCHESTER BRANCH

At its March meeting the Rochester Branch established a record for itself by completing the business portion in 20 minutes. Bob Flint, Joe Hull and Eddie Wallin were elected Delegates to the National Convention; the Boston Resolution to increase dues was voted down; and Verne Schaeffer was elected Chairman of the Program Committee for the Annual May Meeting.

Mr. B. S. Ames, of Maas & Waldstein Company, then spoke about "The Application of Clear Finishes to Zinc and Chromium". He illustrated his interesting and timely talk with a number of attractive exhibits of articles, which showed the variety of effects that can be achieved with finishes containing transparent pigments.

Walter F. Swanton, *Secretary*

ST. JOSEPH VALLEY BRANCH

Sixteen members and guests were present for the dinner, and twenty-one attended the technical session on March 7.

The minutes of the February meeting were corrected when Dr. Harold J. Wiesner advised that the incoming president of the Branch would be a Delegate elected to membership. Dr. Wiesner reported that the tickets for the Ladies' Night dinner will be $2.50 per plate, with the Branch paying the difference of the cost.

The Chairman of the Nominating Committee, Ralph D. Wysong, read the nominations for officers for 1951-1952. Election will be held at the April meeting.

Librarian Dr. Ernest J. Wilhelm introduced Mr. W. D. Gordon, of MacDermid, Inc., who presented a most concise and complete paper on the "Removal of Impurities in Cyanide Copper and Bright Nickel Solutions", illustrated with slides. Particular emphasis was placed on the sulfide treatment for removal of zinc and lead and the barium sulfide treatment for removal of chromium from cyanide copper solutions. Four methods of purification of bright nickel solutions were discussed in detail, including chemical precipitation of impurities, electrolytic deposition, absorbtion, and cementation. The presentation was such that the practical platers could follow the sequence of steps in each treatment and understand the highly technical problems of purification. After the lecture, Mr. Gordon answered questions from the floor.

Eugene Roth, *Secretary-Treasurer*

SOUTHEASTERN BRANCH

The regular monthly meeting on March 9 was held in the Georgia Tech dining hall with 18 members and guests in attendance.

The Branch was honored by having two guest speakers. Dr. R. B. Saltonstall, of The Udylite Corporation, gave an interesting talk on "Bright Finishes". Dwelling on the procedure known as leveling, he held the attention of all.

Mr. Raymond Shock, Executive Secretary of the National Association of Metal Finishers, explained a survey that is now in progress to let the Government know exactly what can be expected of the job-shop plater in case of an all-out emergency. He urged all job-shop owners to take part. C. H. Hohner, of The Udylite Corporation, introduced the speakers.

The following members were appointed by President E. J. Slemons to serve as Nominating and Election Committee: William A. Baltzell, H. B. Stogner, William F. Kelly, C. H. Hohner, and Dudley Smith.

After the meeting had adjourned, the gang went to the Biltmore Hotel for refreshments and song.

Wm. T. Weymouth, *Secretary-Treasurer*

SPRINGFIELD BRANCH

The meeting on February 26 had an attendance of thirty-seven.

Edward R. Dupuis, Norman Plank, and Paul Lyman were elected Delegates, and E. E. Couture, L. R. Fountain, and J. E. Costigan, alternates. The Boston Branch proposal to increase dues and per capita tax was referred to the Board of Managers for action and reply.

J. E. Costigan introduced Mr. I. Laird Newell, of the Henry Souther Engineering Company, Hartford, Conn., who spoke about and showed many samples of "Surface Conversion Coatings for Metals". Such coatings should be continuous (without pinholes), insoluble and wear resistant, promote paint adhesion, and have good appearance. The oxides, hydrates, phosphates, and chromates seem to provide the best coatings. The reactions may be chemical or electrochemical, the electrochemically produced coatings usually having superior physical properties. A wide variety of coatings for aluminum, magnesium, zinc, copper and steel were defined and compared.

Following a discussion, which centered around coatings for zinc, refreshments were provided by Hampden Color & Chemical Company.

Philip W. Prouty, *Secretary*

SYRACUSE BRANCH

The February meeting of the Syracuse Branch was held at the plant of the Brown-Lipe Chapin Division of General Motors Corporation in Syracuse. The fifty-five members present were escorted on a tour of the plating and process sections of the plant, which was an education for many who had never seen plating done on such a large scale. An excellent dinner was served through the courtesy of the Division.

The speaker of the evening, Mr. C. F. Nixon, A. E. S. First Vice-President and Director of Process Engineering, Ternstedt Division, General Motors Corporation, Detroit, was presented by John Tierney, Process Engineer of the B. L. C. Division. Mr. Nixon's talk covered all forms of "Mechanical Finishing" including Gyro-Polishing. A number of lantern slides supplemented his talk on this big subject. Mr. Nixon also spoke briefly about some of the business problems of the Society.

The nominating committee presented the slate for the coming year.

The Syracuse Branch is indebted to B. L. C. and Ternstedt Div. for a very educational and enlightening meeting.

Lindley S. Wood, *Secretary*

Convention News

(*Continued from page 456*)

including a number of important job shops.

Culturally, Buffalo has contributed a great deal. Schools include University of Buffalo, State Teachers College, Canisius College, and Cornell University Aeronautical Research Laboratory. Kleinhans Music Hall, which houses Buffalo Philharmonic Orchestra, is one of the most modern in the country. Albright Art Gallery in Delaware Park is world famous, and the Museum of Science houses internationally known exhibits.

Buffalo's Civic Center with its towering City Hall is most imposing, and its many beautiful homes a credit to a modern city.

The Headquarters Hotel

Again an A. E. S. Convention will be held in a Statler Hotel with its excellent service to convention visitors.

Buffalo occupies a special spot in the Statler organization, because it was here that its founder built his first hotel, for the Pan-American Exposition in 1901. Unlike its successors it was not a success; after President McKinley had been assassinated at the Exposition, few people wished to see it, and Statler's specially built hotel lost money.

The present Hotel Statler flanks the City Hall and is only a few blocks from theatres and other amusement places. It was built to handle conventions, with a large number of rooms for meetings, banquets and exhibits. Dining facilities include a Main Dining Room, the Cafe Lounge, cafeteria and coffee shop, and there is a quiet lounge bar to which the busy convention visitor can repair for refreshments.

Membership Report of the A. E. S.

Elections

BOSTON: C. E. A. Solla

BUFFALO: T. A. Ferguson, F. Kieffer, D. Maggione, C. L. Monks, J. T. Wiarda

CHICAGO: C. Dobson, R. A. Hoegh, Jr., R. A. Johnson, H. Jezierny

CINCINNATI: S. Garfinkel, R. R. Rechel

CLEVELAND: D. E. Davidson, O. C. Heighton, P. Weidle

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Membership Competition

BRANCH	Membership April 1, 1950	New Members*	Net Change in Membership*	Per Cent Net Change*
First Group				
Grand Rapids	141	12	+23½	+16.7
Milwaukee	124	28	+15½	+12.5
Chicago	372	56	+37½	+10.1
New York	280	27	+20½	+ 7.3
Boston	142	19	+ 8	+ 5.6
Los Angeles	201	33	+10½	+ 5.2
Cleveland	195	37	+ 9	+ 4.6
Philadelphia	192	28	+ 7½	+ 3.9
Hartford	132	12	+ 5	+ 3.8
Toronto	124	7	+ 3½	+ 2.8
Pittsburgh	142	6	+ 4	+ 2.8
Waterbury	125	8	+ 3½	+ 2.8
Detroit†	483	60	+11	+ 2.3
Newark	238	16	+ 1½	+ 0.6
Bridgeport	155	9	− 2	− 1.3
Second Group				
Montreal	68	12	+ 9½	+14.0
Melbourne†	111	22	+14	+12.6
Buffalo	77	13	+ 9	+11.7
St. Louis	97	16	+ 8½	+ 8.8
Indianapolis	97	14	+ 2½	+ 2.6
New Haven	106	10	+ 2½	+ 2.4
Baltimore-Washington	85	8	+ 1	+ 1.2
Syracuse	85	17	+ 1	+ 1.2
Cincinnati	87	7	+ ½	+ 0.6
Dayton	97	1	− 5	− 5.2
Twin City	71	3	− 5	− 7.0
Adelaide	72	7	− 7	− 9.7
Providence-Attleboro	112	3	−12	−10.7
Rochester	104	9	−15	−14.4
Sydney	109	8	−16	−14.7
Third Group				
Allentown-Reading	37	7	+ 6	+16.2
Columbus	47	3	+ 5½	+11.7
St. Joseph Valley	66	11	+ 6½	+ 9.8
Hamilton	23	1	+ 1½	+ 6.5
Springfield	51	4	+ 2	+ 3.9
Rockford	64	15	+ 1½	+ 2.3
Western Ontario	23	..	.....	.....
San Francisco	66	18	− 1	− 1.5
Lancaster	62	5	− 1	− 1.6
Toledo	49	3	− 4	− 8.2
Jackson-Lansing	57	4	− 5½	− 9.6
Louisville	25	3	− 2½	−10.0
Saginaw Valley	64	5	− 7	−10.9
Southeastern†	54	4	− 6	−11.1
Outside Competition				
Houston	...	20	+25	.....
Dallas-Fort Worth	...	..	+ 6	.....
At Large	104	28	+10	.....
In Transfer	27	..	−20	.....
Total A. E. S.	5,236	642	+143	+ 2.7

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*Subject to correction. †Winners of membership competition in 1949–1950.

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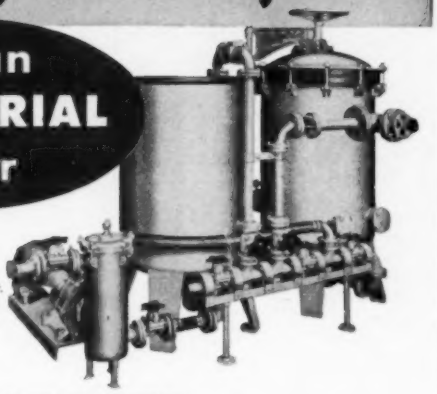

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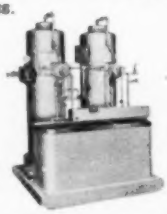

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NEW YORK: J. Carruba, D. C. Gaddi, J. Haas, J. Morin, A. M. Pflomm, H. R. Powers, M. Rubenstein
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SOUTHEASTERN: H. A. Blum
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BALTIMORE-WASHINGTON meets second Tuesday of each month with meetings in Baltimore at the Engineers' Club and in Washington, D. C., at the National Bureau of Standards. Secretary, Vincen J. Hughes, Jr., Hughes Chemical Supply Company, 1411 Fleet Street, Baltimore 31, Md.

BOSTON meets first Thursday of each month in Hotel Statler. Secretary, Dr. George P. Swift, 53 Galen Street, Watertown 72, Mass. Research Finance Committee Chairman, Eugene P. Carter, c/o United Carr Fastener Corporation, 81 Ames Street, Cambridge, Mass.

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CHICAGO meets second Friday of each month at 8 P. M. at Western Society of Engineers, 84 E. Randolph Street. Secretary-Treasurer, Paul Glab, 882 N. Paulina Street, Chicago, Ill. Research Finance Committee Chairman, R. F. Ledford, c/o Hanson-Van Winkle-Munning Company, 2910 Carroll Avenue, Chicago 12, Ill.

CINCINNATI meets fourth Wednesday of each month at 8 P. M. in Engineering Society Headquarters, McMillan Street and Woodburn Avenue. Secretary, Charles Wise, c/o The Buckeye Products Company, 7020 Vine Street, Cincinnati 16, Ohio.

CLEVELAND meets first Friday of each month in Cleveland Hotel at 8 P. M. Secretary-Treasurer, Harry Pochapsky, 24961 Euclid Avenue, Euclid 17, Ohio. Research Finance Committee Chairman, Howard A. Blouch, 12901 Elmwood Avenue, Cleveland 11, Ohio.

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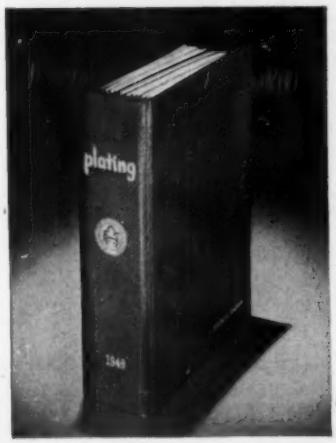

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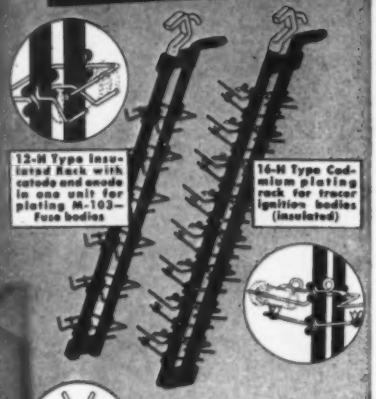
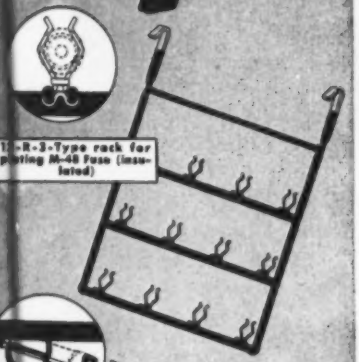
New — Wonderful Synthetic Insulation



12-H Type Insulated Rack with catode and anode in one unit for plating M-103—Fuse bodies

16-H Type Cadmium plating rack for tracer ignition bodies (insulated)

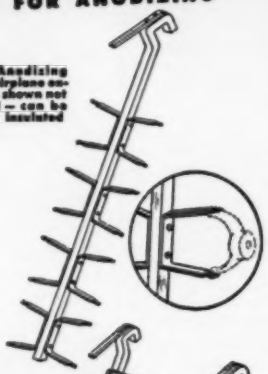


12-R-3-Type rack for plating M-48 Fuse (insulated)

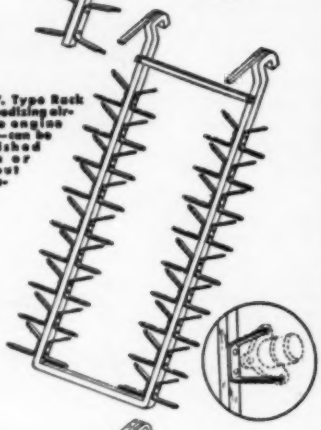
15-R-3 Cradle Type cadmium plating rack for fuse liners—where out and inside cadmium plating is required (insulated)

FOR ANODIZING

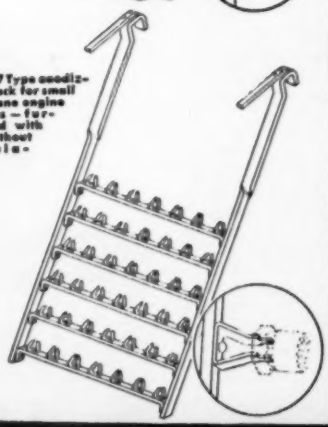
8-H Type Anodizing Rack for airplane engine parts shown not insulated — can be furnished insulated

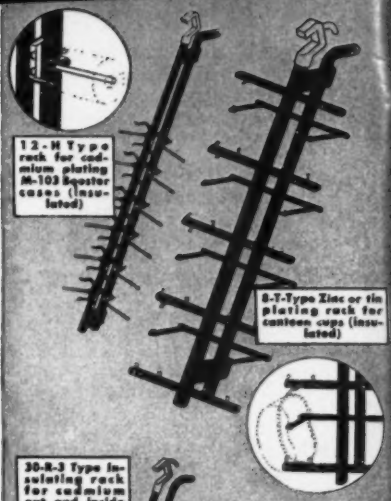


36-LV. Type Rack for anodizing airplane engine parts—can be furnished with or without insulation



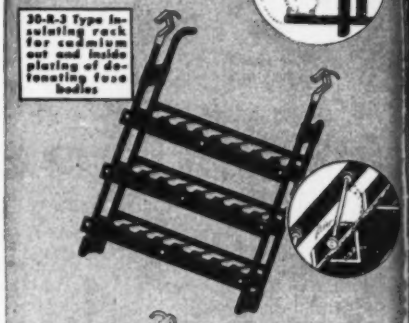
42-R-7 Type anodizing rack for small airplane engine parts — furnished with or without insulation



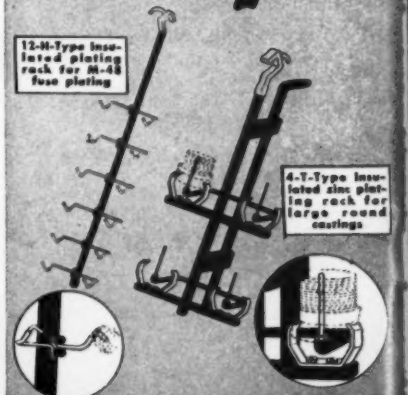


12-H Type rack for cadmium plating M-103 Booster cases (insulated)

8-T-Type Zinc or tin plating rack for canteen cups (insulated)



30-R-3 Type insulating rack for cadmium out and inside plating of defonating fuse bodies



12-H-Type insulated plating rack for M-48 fuse plating

4-T-Type insulated zinc plating rack for large round castings

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METAL	GOVERNMENT SPECIFICATION	ACP SPECIFICATION CHEMICAL
STEEL	JAN-C-490, Grade I U.S.A. 57-0-2, Type II, Class C U.S.A. 51-70-1, Finish 22.02, Class C	"GRANODINE"
	U.S.A. 57-0-2, Type II, Class B U.S.A. 51-70-1, Finish 22.02, Class B	"PERMADINE"
	U.S.A. 57-0-2, Type II, Class A U.S.A. 51-70-1, Finish 22.02, Class A	"THERMOIL-GRANODINE"
ALUMINUM	MIL-C-5541 MIL-S-5002 AN-F-20 U.S. Navord O.S. 675 16E4 (Ships)	"ALODINE"
ZINC	QQ-P-416 RR-C-82 JAN-F-495 AN-F-20 U.S.N. Appendix 6	"LITHOFORM"

"GRANODINE"®

"GRANODINE" forms a zinc phosphate coating on steel and zinc surfaces. This non-metallic bond holds and protects the paint finish and thus preserves the metal underneath.

"PERMADINE"®

"PERMADINE" forms an oil-adsorptive zinc phosphate coating on steel, which, when treated with rust inhibiting oil, is highly corrosion resistant.

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"THERMOIL-GRANODINE" forms a manganese-iron phosphate coating on steel, which, when oiled, provides wear-resistance for rubbing parts — and, when oiled or painted, inhibits corrosion.

"ALODINE"®

"ALODINE", the new ACP protective coating chemical for aluminum, anchors the paint finish and protects the metal painted or unpainted.

"LITHOFORM"®

"LITHOFORM" makes paint stick to galvanized iron and other zinc and cadmium surfaces.

Write for more information on these products. Send for new descriptive folders on the ACP metal-protective, rust proofing and paint bonding chemicals listed in this advertisement.

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Future Meetings

TORONTO BRANCH, A. E. S. Annual Educational Session and Banquet in General Brock Hotel, Niagara Falls, Ontario, on May 12.

AMERICAN SOCIETY FOR TESTING MATERIALS Annual Meeting in Chalfonte-Haddon Hall, Atlantic City, N. J., on June 18–22.

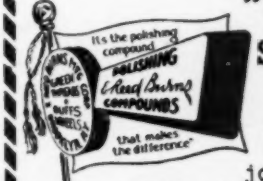
AMERICAN ELECTROPLATERS' SOCIETY Annual Convention in Hotel Statler, Buffalo, N. Y., on July 30–August 2.

AMERICAN CHEMICAL SOCIETY Diamond Jubilee Meeting in New York City on September 3–7.

THE ELECTROCHEMICAL SOCIETY Fall Conference in Statler Hotel, Detroit, Mich., on October 10–13.

3RD ANNUAL METAL SHOW at Michigan State Fair Grounds, Detroit, Mich., on October 15–19.

for CARBON STEEL finishing during this emergency.....



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TECHNICAL DATA SHEET NO. 5

ROCHELTEX for COPPER PLATING

ROCHELTEX is a liquid addition agent which can be added to any cyanide copper plating solution for use in any type of equipment. Plating costs are reduced by the addition of ROCHELTEX due to the reduction of cyanide additions required and by retarding the carbonate buildup. Usually a reduction of 50% of cyanide additions is realized. In addition to this saving, ROCHELTEX is less expensive than other addition agents such as Rochelle Salts.

ROCHELTEX aids in producing brighter, more uniform copper deposits at high current densities. A 20% increase in cathode efficiency is normal. Semi-bright lustrous deposits are obtained which are easily buffed or in many cases may be bright nickel plated without buffing. Nickel deposits over ROCHELTEX copper are brighter and of more uniform color due to the fine uniform grain size of the copper deposited at all normal current densities.

TYPICAL FORMULA:

Copper Cyanide	4.0 oz./gal.
Sodium Cyanide or Potassium Cyanide	5.0 - 5.5 oz./gal.
ROCHELTEX	6.5 oz./gal.
Sodium Carbonate	7% by volume
Sodium or Potassium Hydroxide	1 oz./gal.
	1/2-1 oz./gal.

AVAILABLE NOW FOR IMMEDIATE DELIVERY

- ANODEX Reverse Current Cleaners
- TROXIDE Dry Acid Salts for Pickling
- BLACKMAX Salts for a Jet-Black Finish
- METEX Zinc Stripper Alkaline Powder

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MAC DERMID
★ *Incorporated* ★
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INDICATE A 440.

PLATEMANSHIP

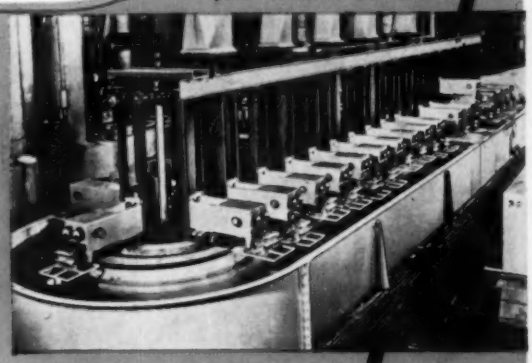
H-VW-M's unique combination of:

. . . the most modern and complete laboratory for testing and development

. . . ability to provide complete equipment and materials for every plating and polishing need

. . . the complete background of knowledge and experience in every aspect of plating and polishing.

H-VW-M elevator-type full-automatic conveyor built during World War II to precision-plate bearings. Basically designed to provide independent control for each rack load.



Only H-VW-M PLATEMANSHIP can provide all THESE PLUS VALUES

in elevator type full-automatic conveyors

. . . They're specifically designed to meet unusual and exacting conditions

. . . They have high lifts and deep tanks for low-ceiling plating rooms; function equally well with low lifts and shallow tanks

. . . They have a wide range of carrier spacing

. . . They have rigid carrier arms to which rigid fixtures may be attached

. . . They are adaptable to a wide range of weight and current loads, from aluminum parts to heavy steel sections

. . . They have versatility—individual treatments can be cut in and out or timing varied to suit requirements

. . . They have simplified means of ventilation

Today's precision plating is the direct result of the stricter demands created by World War II when ordnance parts were plated inside and outside with various thicknesses of deposits. H-VW-M made major contributions to this development . . . drew upon *Platemanship* to engineer and build conveyors able to meet the most stringent and exacting requirements.

Precision plating is again vital to defense . . . and H-VW-M is again ready to draw upon a tremendous backlog of knowledge and experience to provide conveyors precisely right for the task at hand. If you are seeking contracts for plating, pickling, cleaning or anodizing, why not look to H-VW-M . . . and *Platemanship* . . . to secure the right equipment for the job?

Write for Bulletin FA-103 for complete information of H-VW-M Full-Automatic conveyors.

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